Cat. No. W404-E1-14

## DRT2 Series

# DeviceNet™ Slaves

# OPERATION MANUAL

OMRON

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# DRT2 Series DeviceNet Slaves

## Operation Manual

*Revised June 2024*

# Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

⚠ **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

⚠ **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

# OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

# Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

**Note** Indicates information of particular interest for efficient and convenient operation of the product.

***1,2,3...*** 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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# About this Manual:

This manual describes the installation and operation of an DeviceNet Smart Slave Units and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate the DeviceNet Smart Slave Units. **Be sure to read the precautions provided in the following section.**

The following manuals also cover information related to DeviceNet applications. Use the *DeviceNet Operation Manual* together with other required manuals.

| Manual | Contents | Cat. No. |
|---|---|---|
| DeviceNet™ Operation Manual | Describes the configuration and construction of a DeviceNet network, including installation procedures and specifications for cables, connectors, and other connection devices, as well as information on functions, operating procedures, and applications. | W267 |
| DeviceNet™ Masters Operation Manual | Describes the models, specifications, functions, operating procedures, and applications of C200HX/HG/HE, CVM1, and CV-series DeviceNet Master Units. | W379 |
| DeviceNet™ CS/CJ Series Units Operation Manual | Describes the models, specifications, functions, operating procedures, and applications of CS-series and CJ-series DeviceNet Master Units. | W380 |
| DeviceNet™ DRT2 Series Slaves Operation Manual (this manual) | Describes the models, specifications, functions, operating procedures, and applications of DRT2-series Smart Slave Units. | W404 |
| DeviceNet™ DRT1 Series Slaves Operation Manual | Describes the models, specifications, functions, operating procedures, and applications of DRT1-series Smart Slave Units. | W347 |
| DeviceNet™ Configurator Ver. 2.□ Operation Manual | Describes the operating procedures of the DeviceNet Configurator. | W382 |
| DeviceNet™ MULTIPLE I/O TERMINAL Operation Manual | Describes the models, specifications, functions, operating procedures, and applications of the DeviceNet MULTIPLE I/O TERMINALs. | W348 |

***Precautions*** provides general precautions for planning, installing, and operating the DeviceNet DRT2-series Smart Slaves and related devices.

***Section 1*** provides an overview of the DeviceNet DRT2-series Smart Slaves, including lists of models, and information on features that were not included in the DRT1-series Slaves.

***Section 2*** provides information on hardware aspects of Masters and Slaves connected to a DeviceNet Network to ensure the proper operation of the system. Included are system configuration examples, basic procedures for wiring, details on mounting and setting Master and Slave Units, procedures for connecting cables and power supplies, creating I/O tables, creating and registering scan lists, and checking operation of the system.

***Section 3*** provides specifications and indicator displays that are common to all Slaves. The allocation of remote I/O memory for Smart Slaves is also described here.

***Section 4*** describes the functions of DRT2-series Smart Slaves and their applications, including operation procedures using a DeviceNet Configurator.

***Section 5*** provides the specifications and describes the components, terminal arrangements, basic procedures for wiring, and methods for connecting cables of General-purpose Slaves. Information on Slave settings, mounting and wiring methods are also provided separately for each Slave type.

***Section 6*** provides the specifications and describes the components, terminal arrangements, basic procedures for wiring, and methods for connecting cables of Environment-resistive Slaves (conforming to IP67). Information on Slave settings, mounting and wiring methods are also provided separately for each Slave type.

# About this Manual, Continued

***Section 7*** provides the specifications, terminal arrangements, mounting procedures, and connection methods of Analog I/O Terminals. Information is included on types of I/O data that can be allocated, allocation methods and procedures, and math operation processing. Setting methods using the Configurator are also described.

***Section 8*** provides information on the time required for a complete communications cycle, for an output response to be made to an input, to start the system, and to send messages.

***Section 9*** describes error processing, periodic maintenance operations, and troubleshooting procedures needed to keep the DeviceNet Network operating properly. We recommend reading through the error processing procedures in both this manual and the operation manual for the master being used before operation so that operating errors can be identified and corrected more quickly.

***Appendix A*** provides lists of DeviceNet explicit messages and their basic format.

***Appendix B*** provides information on using masters from other companies and Slave device profiles necessary for multi-vendor applications, including information on installing EDS files.

***Appendix C*** describes restrictions on reading the total ON time and contact operation counter for all Slaves at once.

***Appendix D*** provides lists of standard models of DRT2-series Smart Slaves and connectable devices.

***Appendix E*** shows the current consumptions of DRT2-series Smart Slaves.

***Appendix F*** provides precautions for connecting two-wire DC sensors.

| | |
|---|---|
| ⚠ **WARNING** | Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given. |

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# PRECAUTIONS

This section provides general precautions for installing and using the DeviceNet Smart Slave and related devices.

**The information contained in this section is important for the safe and reliable application of the DeviceNet Smart Slave. You must read this section and understand the information contained before attempting to set up or operate a DeviceNet network using DeviceNet Smart Slaves.**

# 1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of purchasing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and connecting FA systems.
- Personnel in charge of managing FA systems and facilities.

# 2 General Precautions

The user must operate the product according to the specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with redundant safety mechanisms.

This manual provides information for installing and operating OMRON DeviceNet products. Be sure to read this manual before operation and keep this manual close at hand for reference during operation.

**⚠ WARNING** It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC system to the above mentioned applications.

# 3 Safety Precautions

**⚠WARNING** Never attempt to disassemble any Units while power is being supplied. Doing so may result in serious electrical shock or electrocution.

**⚠WARNING** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

**⚠WARNING** Input only the specified range of voltage or current to a Unit. A current or voltage exceeding the specified range may cause malfunction or fire.

**⚠WARNING** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. Unexpected operation, however, may still occur for errors in the I/O control section, errors in I/O memory, and other errors that cannot be detected by the self-diagnosis function. As a countermeasure for all such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposits on or burning of the output relays, or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

**⚠WARNING** The CPU Unit refreshes I/O even when the program is stopped (i.e., even in PROGRAM mode). Confirm safety thoroughly in advance before changing the status of any part of memory allocated to Output Units, Special I/O Units, or CPU Bus Units. Any changes to the data allocated to any Unit may result in unexpected operation of the loads connected to the Unit. Any of the following operations may result in changes to memory status.

- Transferring I/O memory data to the CPU Unit from a Programming Device
- Changing present values in memory from a Programming Device
- Force-setting/-resetting bits from a Programming Device
- Transferring I/O memory files from a Memory Card or EM file memory to the CPU Unit
- Transferring I/O memory from a host computer or from another PLC on a network

**⚠Caution** Do not install the Unit that has relay outputs on the locations that always subject to vibration. It may cause a failure or malfunction.

# 4 Operating Environment Precautions

Install the system properly according to the directions in this manual.

Do not operate the control system in the following places.

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to water, oil, or chemicals (General-purpose Slaves)
- Locations subject to acid or chemicals (Environment-resistive Slaves).
- Locations subject to shock or vibration.

Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

⚠ **Caution** The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

# 5 Application Precautions

Observe the following precautions when using the DeviceNet Smart Slave.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Provide external interlock circuits, limit circuits, and other safety circuits in addition to any provided within the PLC to ensure safety.
- Mount the Unit to a DIN Track or mount it with screws.
- If the system is installed at a site with poor power supply conditions, take appropriate measures to ensure that the power supply remains within the rated voltage and frequency specifications.
- Provide circuit breakers and other safety measures to provide protection against shorts in external wiring.
- Always ground the system to 100 Ω or less when installing the system to protect against electrical shock.
- Always turn OFF the communications power supply and the power supplies to the PLC and Slaves before attempting any of the following.
    - Mounting or removing a Unit such as an I/O Unit, CPU Unit, Memory Cassette, or Master Unit.
    - Mounting or removing Remote I/O Terminal circuit sections.
    - Assembling any devices or racks.
    - Setting rotary switches.
    - Connecting or wiring cables.
    - Connecting or disconnecting connectors.
- Do not attempt to disassemble, repair, or modify any Units.
- Be sure that all the terminal screws are tightened to the torque specified in the relevant manuals. Loose screws may cause fire, malfunction, or damage the Unit.
- Be sure that all the mounting screws and cable connector screws are tightened to the torque specified in the relevant manuals.
- Do not remove the label from a Unit before wiring. Always remove the label after completing wiring, however, to ensure proper heat dispersion.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals.
- Double-check all switch settings and wiring before turning ON the power supply.
- Always follow the electrical specifications for terminal polarity, communications path wiring, power supply wiring, and I/O jumpers. Incorrect wiring can cause failures.
- Be sure to wire the Unit correctly.
- Be sure to wire terminals with the correct polarity.
- Be sure that the communications cable connectors and other items with locking devices are properly locked into place.
- Do not drop the Unit or subject the Unit to excessive vibration or shock. Doing so may cause malfunction or damage to the Unit.
- Use the special packing box when transporting the Unit. Ensure that the product is handled carefully so that no excessive vibration or impact is applied to the product during transportation.

- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity.
- Do not apply voltages to the Input Units in excess of the rated value.
- After replacing a CPU Unit or Special I/O Unit, resume operation only after transferring to the new CPU Unit or Special I/O Unit the contents of the DM Area, HR Area, and other data required for resuming operation.
- Check the user program for proper execution before actually running it with the system.
- Observe the following precautions when wiring the communications cables.
    - Wire the communications cables separately from the power lines or high-tension lines.
    - Do not bend the communications cables excessively.
    - Do not pull on the communications cables excessively.
    - Do not place objects on top of the communications cables.
    - Route communications cables inside ducts.
- Confirm that the system will not be adversely affected before performing the following operations.
    - Changing the operating mode of the PLC
    - Setting/resetting any bit in memory
    - Changing the present value of any word or any set value in memory
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up.
- When replacing parts, such as a relay, make sure the replacement part has the correct specifications.
- Be sure that metal filings do not enter the Unit when wiring or installing.
- Use correct parts for wiring.
- Use the specified communications cables and connectors.
- Always enable the scan list before operation.
- Before clearing the scan list of a Unit that has user-allocated remote I/O, always confirm that no errors occur after the I/O Area setting is changed to fixed allocation.
- When adding a new node to the network, check that the new node's baud rate is the same as the baud rate set on the other nodes.
- Do not extend connection distances beyond the ranges given in the specifications.
- Although the Environment-resistive Slaves have IP67 enclosure ratings, do not used them in applications where the Slave is always submerged in water.
- Always turn ON power to the I/O power supply before turning ON power to the devices on the load side. If the I/O power supply is turned ON after the power supply of the devices on the load side, temporary errors may result in the devices on the load side because the output terminals on DC Output Units and other Units will momentarily turn ON when power is turned ON to the I/O power supply.

# 6 Conformance to EC Directives

## 6-1 Applicable Directives

- EMC Directives
- Low Voltage Directive

## 6-2 Concepts

**EMC Directives**

OMRON devices are designed so that they comply with the related EMC Directives so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC Directives (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

**Note** Applicable EMC (Electromagnetic Compatibility) standards are as follows:

EMS (Electromagnetic Susceptibility): EN 61000-6-2
EMI (Electromagnetic Interference): EN 61000-6-4
(Radiated emission: 10-m regulations)

**Low Voltage Directive**

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for EN 61131-2.

## 6-3 Conformance to EC Directives

The CompoNet Master Units comply with EC Directives. To ensure that the machine or device in which a CompoNet Master Unit is used complies with EC Directives, the CompoNet Master Unit must be installed as follows:

*1,2,3...*

1. The CompoNet Master Unit must be installed within a control panel.
2. You must use reinforced insulation or double insulation for the DC power supplies used for the communications power supply and I/O power supplies.
3. CompoNet Master Units complying with EC Directives also comply with the Common Emission Standard (EN 61000-6-4). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.
4. Conformance with the EC Directives was confirmed with a system configuration using I/O wiring lengths of less than 30 m.

# SECTION 1
# Smart Slaves and Features

This section provides an overview of the DeviceNet DRT2-series Smart Slaves, including lists of models, and information on features that were not included in the DRT1-series Slaves.

# 1-1 DRT2 Features

## 1-1-1 Overview

The DRT2-series Smart Slaves can be used to collect various information that improves the operating rate of the equipment, in addition to performing basic input and output of ON/OFF signals.

A maintenance system can be configured separately from the control system. This enables a balance between control and maintenance using an existing DeviceNet network, contributing to reduced startup time, shorter recovery time when problems occur, and preventative maintenance of the equipment.

- Control System
  The default settings for remote I/O communications with the PLC are the same as for previous Slaves, whereby real I/O is allocated for each node address. One difference with previous Slaves is that an area for Smart Slave status information can be allocated to the Smart Slaves within the IN Area of the Master. This is in addition to real I/O. (Settings are performed using the Configurator or explicit messages.)
- Maintenance System
  The Configurator is used to read and write various types of equipment information stored in the DRT2 Slave. The same equipment information can also be read and written by sending explicit messages to the DRT2 Slave from the Master (such as a PLC or a DeviceNet Master Board mounted in a personal computer).

## 1-1-2 Features

DRT2-series Slaves have the following features.

### Common Features

**Node Addresses Set Using Rotary Switches**

Node addresses are set using rotary switches, which are clearer than the previous DIP switch settings. Node addresses can also be set from the Configurator.

**Automatically Detected Baud Rate**

Previous models required the baud rate to be set using the Slave's DIP switch, but Smart Slaves do not require the baud rate to be set. The Smart Slave automatically operates at the baud rate of the Master Unit.

**Remote I/O Communications**

When using default remote I/O communications from the PLC for DRT2 Slaves, only real I/O is allocated. This is the same method used by the previous DRT1 Slaves.

The following status information can be allocated in addition to real I/O, in the IN Area of the Master by using the Configurator or explicit messages to make user settings (default connection path settings):

Generic Status Flags, Top/Valley Detection Timing Flags, Analog Status Flags

**Network Power Supply Voltage Monitor**

As part of the remote I/O function, Network power supply voltages (present, peak, and bottom values) can be recorded in the Slave. The Configurator can be used to read the information. The Slave also maintains a set value for monitoring the voltage, and will provide notification in the Status Area if the voltage drops below the set level.

**Unit Conduction Time Monitor**

The time that the Slave's internal circuit power is ON can be totaled and recorded. The Configurator or explicit messages can be used to read the information. The Slave also maintains a set value for monitoring the Unit's ON time, and will provide notification in the Status Area if the set time is reached.

**Slave Comments**

User-set names can be assigned and saved in the Slave for each Unit.

**I/O Comments**

User-set names can be assigned and saved in the Slave for each of the I/O contacts, such as sensors or valves, that are connected to the Slave.

**Communications Error History Monitor**

The error statuses (communications error cause code and communications power supply voltage when error occurred) for the last four communications errors that occurred can be recorded in the Slave. The Configurator can be used to read the information.

**Last Maintenance Date**

The dates on which maintenance is performed can be written to the Unit using the Configurator.

## Features of General-purpose Slaves and Environment-resistive Slaves

**No Internal Circuit Power Supply Wiring for Slaves**

The communications power supply is used for the internal circuit power for the Unit. This eliminates the need to wire the Unit's internal circuit power supply.

**I/O Power Status Monitor**

The I/O Power Status Monitor is used to detect whether the I/O power supply is connected and provide notification in the Status Area. The Configurator or explicit messages can be used to read the information.

**Input Filter**

The input filter is used to read the input value several times during the set interval and remove irregular data caused by noise and switch chattering.

This function can also be used to create ON/OFF delays.

**Power ON Delay**

The I/O power supply can be monitored to stop any input when the I/O power is OFF and for 100 ms after it is turned ON. This function prevents incorrect inputs caused by inrush current at startup after the I/O power is turned ON.

**Contact Operation Counter**

The number of times each input or output contact changes from OFF to ON can be counted (maximum resolution: 50 Hz). The Configurator or explicit messages can be used to read the information. The Slave also maintains a set value for monitoring the number of contact operations, and will provide notification in the Status Area if the set value is reached.

**Note** The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for a single contact.

**Total ON Time Monitor**

This function is used to total and record in the Slave the time that devices, such as sensors and relays, that are connected to the Slave are ON. The Configurator or explicit messages can be used to read the information. The Slave also maintains a set value for monitoring the total ON time, and will provide notification in the Status Area if the set value is reached.

**Note** The Total ON Time Monitor and Contact Operation Counter cannot be used at the same time for a single contact.

**Detection of Sensor Power Short-circuit**

The I/O power supply current is monitored and if the current exceeds the rated current, it is judged to be a sensor power short-circuit and the sensor power output is forced OFF.

Environment-resistive Slaves, Advanced Models: The number of the shorted contact can be checked from the I/O status indicators. The Configurator or explicit message communications can also be used to read which connector or sensor has shorted. The Slave will automatically reset when the cause of the short-circuit has been removed.

Sensor Connector Terminals: When a short-circuit is detected in any of the contacts, the I/O power for the Unit is turned OFF. A short-circuit detection error can be confirmed using the SHTO indicator. The Configurator or explicit messages can also be used to read the error status.

Screw-less Clamp Terminals (DRT2-□D32SLH-1): The number of the shorted contact can be checked using the I/O status indicators. The Configurator or explicit message communications can also be used to read which terminal sensor has shorted. The Slave will automatically reset when the cause of the short-circuit has been removed.

**External Load Short-circuit Detection**

External Load Short-circuit Detection monitors the output load current and if the Output Unit's current exceeds the set value, it is judged to be an external load short-circuit and the output is forced OFF to prevent damage to the Unit's output circuit. When an external load short-circuit is detected, the External Load Short-circuit Detection Flag turns ON. The External Load Short-circuit Detection Flag can be read by either the Configurator or explicit messages.

**Sensor Disconnected Detection**

The I/O power supply current is monitored and it is determined whether a sensor is disconnected. The Configurator or explicit messages can be used to read which sensor is not connected.

## Features of Remote I/O Terminals (General-purpose Slaves)

**Detachable Terminal Block**

The terminal block can be detached.

**Expansion Units**

A Basic Unit can be combined with an Expansion Unit. The various I/O combinations that are possible, such as 16 inputs and 8 outputs, or 24 inputs (16 inputs plus 8 inputs), increase the system configuration possibilities.

**Operation Time Monitor**

### ■ Basic I/O Unit + Expansion Unit

The time that lapses from when the output turns ON to when the input turns ON can be measured at high speed from the Slave (without relying on the ladder program). The Slave also maintains a set value for monitoring the operation time, and will provide notification the Status Area if the set time is exceeded. The Configurator or explicit messages can be used to read the information.
The DRT2-MD16(-1) cannot be expanded with an Expansion Unit, but its operation time can be monitored.

### ■ Three-tier Terminal Block

In contrast to the existing Units, which could only measure I/O (OUT-IN), these Units can also measure operating times for IN-IN and OUT-OUT combinations. In addition, the trigger edge (ON to OFF or OFF to ON) can be selected and input and output numbers can be freely combined for flexible settings.

## Features of Connector Terminals (General-purpose Slaves)

**Wired with Industry Standard Sensor Connectors (Sensor Connector Terminals)**

Industry standard sensor connectors are provided to standardize the I/O wiring, thereby making wiring simpler and less labor intensive.

**Operation Time Monitor**

### ■ Sensor Connector Terminals

The time that lapses from when the output turns ON to when the input turns ON can be measured at high speed from the Slave (without relying on the ladder program). The Slave also maintains a set value for monitoring the operation time, and will provide notification the Status Area if the set time is exceeded. The Configurator or explicit messages can be used to read the information.

■ **MIL Connector Terminals/Board Terminals**

In contrast to the existing Units, which could only measure I/O (OUT-IN), these Units can also measure operating times for IN-IN and OUT-OUT combinations. In addition, the trigger edge (ON to OFF or OFF to ON) can be selected and input and output numbers can be freely combined for flexible settings.

## Features of Screw-less Clamp Terminals (General-purpose Slaves)

**Labor-saving Clamp Terminal Block**

For I/O wiring, a screw-less clamp terminal block is provided. Wiring is reduced by the use of post terminals that can be easily inserted and then later removed by simply pressing a release button.

**Detection Functions (Standard Feature, DRT2-□D□□SLH(-1) Only)**

Detection results can be read by using the Configurator or explicit messages if the sensor short-circuit/disconnected and external load short-circuit/disconnected detection functions are used. The error location can be rapidly specified and restored.

**Operation Time Monitor**

In contrast to the existing Units, which could only measure I/O (OUT-IN), these Units can also measure operating times for IN-IN and OUT-OUT combinations. In addition, the trigger edge (ON to OFF or OFF to ON) can be selected and input and output numbers can be freely combined for flexible settings.

## Features of Environment-resistive Terminals

**Dust-proof and Waterproof Construction (IP67) for High Resistance to Environment**

The environment-resistive construction enables usage in locations subject to oil and water splashes (IP67). An environment-resistive box is not required, enabling greater downsizing and reducing wiring labor.

**No Power Supply Wiring for Input Devices (Advanced Models Only)**

Power for communications, internal circuits, and input devices is shared, making wiring necessary only for the communications power supply. With standard models, a power supply must be wired to I/O devices.

**Connect High-load Devices (1.5 A Max., Advanced Models Only)**

The rated output current is 1.5 A, allowing the direct connection of output devices with high loads.

**Operation Time Monitor (DRT2-MD16CL(-1) and DRT2-□D04CL Only)**

The time that lapses from when the output turns ON to when the input turns ON can be measured at high speed from the Slave (without relying on the ladder program). The Slave also maintains a set value for monitoring the operation time, and will provide notification the Status Area if the set time is exceeded. The Configurator or explicit messages can be used to read the information.

## Analog Slave Features

**Setting the Number of AD Conversion Points (DRT2-AD04 Only)**

The conversion cycle when all 4 analog input points are used is 4 ms max. The AD conversion cycle can be shortened by reducing the number of points used (i.e., the number of AD conversion points).

**Moving Average (Input Units Only)**

Analog Input Terminals and Temperature Input Terminals can calculate the average of the past eight analog input values to produce a stable input value even when the input value is unsteady.

**Scaling**

Scaling allows values to be converted according to the industry unit required by the user. It reduces the number of operations requiring ladder programming in the Master CPU Unit. Scaling also supports an offset function for compensating for errors in scaled values.

**Peak/Bottom Hold (Input Units Only)**

The maximum (peak) and minimum (bottom) values input to Analog Input Terminals and Temperature Input Terminals can be held. These values can then be compared with alarm set values, and flags turned ON as appropriate to indicate the status (comparator function).

**Top/Valley Hold (Input Units Only)**

The top and valley values for values input to Analog Input Terminals and Temperature Input Terminals can be held. The timing of tops and valleys can be monitored with the Top/Valley Detection Timing Flags. The top and valley values can be compared with alarm set values, and flags turned ON as appropriate to indicate the status (comparator function).

**Rate of Change (Input Units Only)**

The rate of change for values input to Analog Input Terminals and Temperature Input Terminals can be obtained for each sampling cycle.

**Comparator (Input Units Only)**

Values input to Analog Input Terminals and Temperature Input Terminals or values after math processing can be compared to the alarm set values (HH, H, L, and LL), and the result indicated with the Analog Status Flags. If the result is outside the set range, the Normal Flag (pass signal) is turned ON.

**Off-wire Detection (Input Units Only)**

With Analog Input Terminals, disconnections can be detected in wiring for analog (voltage or current) inputs that are enabled as AD conversion points. The status can be checked at the Master using the Off-wire Detection Flag. This function is valid only for the input ranges 4 to 20 mA and 1 to 5 V.

With Temperature Input Terminals, disconnections can be detected for each sensor input. The status can be checked at the Master using the Off-wire Detection Flag.

**User Adjustment**

Input (or output) can be adjusted to compensate for errors in the input (or output) voltage or current resulting from the characteristics or connection methods of the input (or output) device. Compensation is performed by applying linear conversion based on the points corresponding to 0% and 100%.

**Cumulative Counter**

A cumulated value that approximates the integral of analog input (or output) values or a temperature input value over time can be calculated and read. Monitor values can also be set in the Unit. When the cumulated count value exceeds the set monitor value, the Cumulative Counter Flag in the area for Generic Status Flags turns ON.

**Communications Error Output (Output Units Only)**

The values output by Output Units when errors occur can be set for each output.

**Top/Valley Count Function**

The number of times the top or valley value is reached can be counted for an application that has fixed cycles of temperature changes. Explicit messages can be used to see if the number of times that is counted has exceeded a monitoring set value.

**Temperature Range Timing Function**

The length of time that the system is at a user-set temperature or within a user-set temperature range can be measured in seconds. Explicit messages can be used to see if the measured time has exceeded a monitoring set value.

**Input Temperature Variation Detection Function**

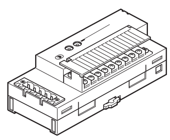
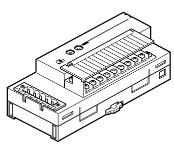
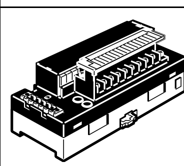
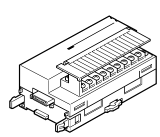
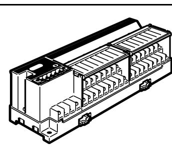
A relative comparison can be made between two inputs (0 to 3) and to detect temperature differences between two inputs or with a monitoring set value. Explicit messages can be used to see if the temperature difference has exceeded a monitoring set value.

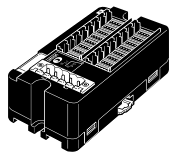
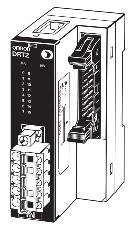
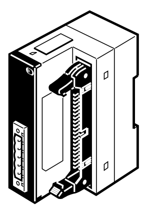
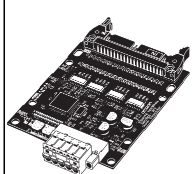
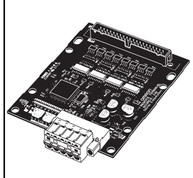
# 1-2 DRT2 Slaves

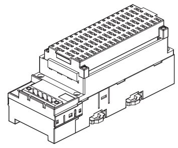
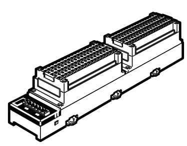
The DRT2-series Smart Slaves are classified into the following categories.

- General-purpose Slaves
  Slaves with digital I/O functions using standard connectors for communications cables.
- Environment-resistive Slaves
  Slaves with I/O functions using round waterproof connectors for communications cables.
- Analog Slaves
  Slaves with analog I/O functions using standard connectors for communications cables.

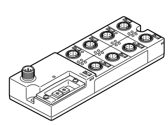
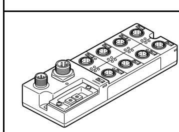
## 1-2-1 General-purpose Slaves

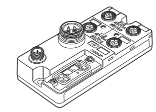
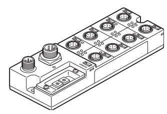
| | Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|---|
| Remote I/O Terminals | Remote I/O Terminals with Transistors |  | 8 input points (NPN) | DRT2-ID08 | Terminal block mounted/removed using screws. |
| | | | 8 input points (PNP) | DRT2-ID08-1 | |
| | | | 8 output points (NPN) | DRT2-OD08 | |
| | | | 8 output points (PNP) | DRT2-OD08-1 | |
| | |  | 16 input points (NPN) | DRT2-ID16 | |
| | | | 16 input points (PNP) | DRT2-ID16-1 | |
| | | | 16 output points (NPN) | DRT2-OD16 | |
| | | | 16 output points (PNP) | DRT2-OD16-1 | |
| | | | 8 input points/8 output points (NPN) | DRT2-MD16 | |
| | | | 8 input points/8 output points (PNP) | DRT2-MD16-1 | |
| | Remote I/O Terminal with Relay Outputs |  | 16 output points | DRT2-ROS16 | Relay outputs |
| | Remote I/O Terminal Expansion Units with Transistors |  | 16 input points (NPN) | XWT-ID16 | Expansion Unit for increasing inputs or outputs of the Basic Unit. |
| | | | 16 input points (PNP) | XWT-ID16-1 | |
| | | | 16 output points (NPN) | XWT-OD16 | |
| | | | 16 output points (PNP) | XWT-OD16-1 | |
| | | | 8 input points (NPN) | XWT-ID08 | |
| | | | 8 input points (PNP) | XWT-ID08-1 | |
| | | | 8 output points (NPN) | XWT-OD08 | |
| | | | 8 output points (PNP) | XWT-OD08-1 | |
| | Remote I/O Terminals with 3-tier Terminal Blocks and Transistors |  | 16 input points (NPN) | DRT2-ID16TA | Wiring locations easy to find (wiring to the same terminal not required).<br>Cannot be expanded with an Expansion Unit. |
| | | | 16 input points (PNP) | DRT2-ID16TA-1 | |
| | | | 16 output points (NPN) | DRT2-OD16TA | |
| | | | 16 output points (PNP) | DRT2-OD16TA-1 | |
| | | | 8 input points/8 output points (NPN) | DRT2-MD16TA | |
| | | | 8 input points/8 output points (PNP) | DRT2-MD16TA-1 | |

| | Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|---|
| Connector Terminals | Sensor Connector Terminals with Transistors |  | 16 input points (NPN) | DRT2-ID16S | Use industry standard sensor connectors. |
| | | | 16 input points (PNP) | DRT2-ID16S-1 | |
| | | | 8 input points/8 output points (NPN) | DRT2-MD16S | |
| | | | 8 input points/8 output points (PNP) | DRT2-MD16S-1 | |
| | MIL Connector Terminals with Transistors |  | 16 input points (NPN) | DRT2-ID16ML | Connects to relay terminal using MIL cable. |
| | | | 16 input points (PNP) | DRT2-ID16ML-1 | |
| | | | 16 output points (NPN) | DRT2-OD16ML | |
| | | | 16 output points (PNP) | DRT2-OD16ML-1 | |
| | | | 16 input points (NPN) | DRT2-ID16MLX | A connecting cable (10 cm) is included. |
| | | | 16 input points (PNP) | DRT2-ID16MLX-1 | |
| | | | 16 output points (NPN) | DRT2-OD16MLX | |
| | | | 16 output points (PNP) | DRT2-OD16MLX-1 | |
| | |  | 32 input points (NPN) | DRT2-ID32ML | Connects to relay terminal using MIL cable. |
| | | | 32 input points (PNP) | DRT2-ID32ML-1 | |
| | | | 32 output points (NPN) | DRT2-OD32ML | |
| | | | 32 output points (PNP) | DRT2-OD32ML-1 | |
| | | | 16 input points/16 output points (NPN) | DRT2-MD32ML | |
| | | | 16 input points/16 output points (PNP) | DRT2-MD32ML-1 | |
| Connector Terminals | Board MIL Connector Terminals with Transistors |  | 32 input points (NPN) | DRT2-ID32B | MIL connectors mounted parallel to board |
| | | | 32 input points (PNP) | DRT2-ID32B-1 | |
| | | | 32 output points (NPN) | DRT2-OD32B | |
| | | | 32 output points (PNP) | DRT2-OD32B-1 | |
| | | | 16 input points/16 output points (NPN) | DRT2-MD32B | |
| | | | 16 input points/16 output points (PNP) | DRT2-MD32B-1 | |
| | |  | 32 input points (NPN) | DRT2-ID32BV | MIL connectors mounted perpendicular to board |
| | | | 32 input points (PNP) | DRT2-ID32BV-1 | |
| | | | 32 output points (NPN) | DRT2-OD32BV | |
| | | | 32 output points (PNP) | DRT2-OD32BV-1 | |
| | | | 16 input points/16 output points (NPN) | DRT2-MD32BV | |
| | | | 16 input points/16 output points (PNP) | DRT2-MD32BV-1 | |

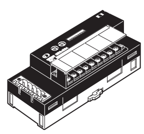
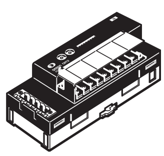
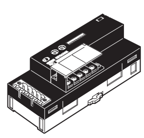
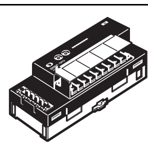
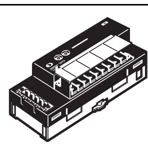
| | Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|---|
| Screw-less Clamp Terminals | Screw-less Clamp Terminal with Transistors |  | 16 input points (NPN) | DRT2-ID16SL | Without detection function |
| | | | 16 input points (PNP) | DRT2-ID16SL-1 | |
| | | | 16 output points (NPN) | DRT2-OD16SL | |
| | | | 16 output points (PNP) | DRT2-OD16SL-1 | |
| | | | 16 input points (NPN) | DRT2-ID16SLH | With detection function |
| | | | 16 input points (PNP) | DRT2-ID16SLH-1 | |
| | | | 16 output points (NPN) | DRT2-OD16SLH | |
| | | | 16 output points (PNP) | DRT2-OD16SLH-1 | |
| | |  | 32 input points (NPN) | DRT2-ID32SL | Without detection function |
| | | | 32 input points (PNP) | DRT2-ID32SL-1 | |
| | | | 32 output points (NPN) | DRT2-OD32SL | |
| | | | 32 output points (PNP) | DRT2-OD32SL-1 | |
| | | | 16 input points/16 output points (NPN) | DRT2-MD32SL | |
| | | | 16 input points/16 output points (PNP) | DRT2-MD32SL-1 | |
| | | | 32 input points (NPN) | DRT2-ID32SLH | With detection function |
| | | | 32 input points (PNP) | DRT2-ID32SLH-1 | |
| | | | 32 output points (NPN) | DRT2-OD32SLH | |
| | | | 32 output points (PNP) | DRT2-OD32SLH-1 | |
| | | | 16 input points/16 output points (NPN) | DRT2-MD32SLH | |
| | | | 16 input points/16 output points (PNP) | DRT2-MD32SLH-1 | |

## 1-2-2 Environment-resistive Slaves

| Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|
| Environment-resistive Terminals, Advanced Models |  | 8 input points (NPN) | DRT2-ID08C | Waterproof, oil-proof, and spatter-proof construction (IP67).<br>Equipped with detection functions. |
| | | 8 input points (PNP) | DRT2-ID08C-1 | |
| | | 16 input points (NPN) | DRT2-HD16C | |
| | | 16 input points (PNP) | DRT2-HD16C-1 | |
| |  | 8 output points (NPN) | DRT2-OD08C | |
| | | 8 output points (PNP) | DRT2-OD08C-1 | |

| Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|
| Environment-resistive Terminals, Standard Models |  | 4 input points (NPN) | DRT2-ID04CL | Waterproof, oil-proof, and spatter-proof construction (IP67).<br>Not equipped with detection functions. |
| | | 4 input points (PNP) | DRT2-ID04CL-1 | |
| | | 4 output points (NPN) | DRT2-OD04CL | |
| | | 4 output points (PNP) | DRT2-OD04CL-1 | |
| |  | 8 input points (NPN) | DRT2-ID08CL | |
| | | 8 input points (PNP) | DRT2-ID08CL-1 | |
| | | 16 input points (NPN) | DRT2-HD16CL | |
| | | 16 input points (PNP) | DRT2-HD16CL-1 | |
| | | 8 output points (NPN) | DRT2-OD08CL | |
| | | 8 output points (PNP) | DRT2-OD08CL-1 | |
| | | 16 output points (NPN) | DRT2-WD16CL | |
| | | 16 output points (PNP) | DRT2-WD16CL-1 | |
| | | 8 input points/8 output points (NPN) | DRT2-MD16CL | |
| | | 8 input points/8 output points (PNP) | DRT2-MD16CL-1 | |

## 1-2-3 Analog Slaves

| Name | Appearance | I/O points | Model number | Remarks |
|---|---|---|---|---|
| Analog Terminals |  | 4 input points<br>(0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA) | DRT2-AD04 | Terminal block mounted/ removed using screws.<br>The DRT2-AD04H is a High-resolution Terminal (1/30,000 FS). |
| |  | 4 input points<br>(0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA) | DRT2-AD04H | |
| |  | 2 output points<br>(0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA) | DRT2-DA02 | |
| Temperature Input Terminals |  | 4 input points<br>(Switchable between R, S, K1, K2, J1, J1, T, E, B, N, L1, L2, U, W, and PLII.) | DRT2-TS04T | Thermocouple input |
| |  | 4 input points<br>(Switchable between PT, JPT, PT2, and JPT2.) | DRT2-TS04P | Platinum resistance thermometer input |

## 1-2-4 Smart Slave Feature Support

Yes: Supported.; No: Not supported.

| Type | General-purpose Slaves | | | | | | |
|---|---|---|---|---|---|---|---|
| | Remote I/O Terminals | | | | | | |
| | Standard | | | Relay outputs | 3-tier terminal block | | |
| Feature | Input | Output | Mix | Output | Input | Output | Mix |
| Operation Time Monitor | Yes (for inputs + outputs only) (See note 1.) | | | | Yes | | |
| Contact Operation Counter | Yes | | | | | | |
| Unit ON Time Monitor | Yes | | | | | | |
| Total ON Time Monitor | Yes | | | | | | |
| Naming Units | Yes | | | | | | |
| Naming connected devices | Yes | | | | | | |
| Network Power Voltage Monitor | Yes | | | | | | |
| I/O Power Status Monitor | Yes | | | No | Yes | | |
| Communications Error History Monitor | Yes | | | | | | |
| Input filter | Yes | No | Yes | No | Yes | No | Yes |
| Preventing malfunctions caused by inrush current at startup | Yes | No | Yes | No | Yes | No | Yes |
| Sensor power short-circuit detection | No | | | | | | |
| Sensor disconnected detection | No | | | | | | |
| External load short-circuit detection | No | | | | | | |
| External load disconnected detection | No | | | | | | |
| Detachable terminal block construction | Yes | | | | | | |
| Automatic baud rate detection | Yes | | | | | | |
| Power supply wiring not required for Units | Yes | | | | | | |
| Power supply wiring not required for input devices | No | | | Yes | No | No | No |
| Expansion using Expansion Units | Yes (See note 2.) | | | | No | No | No |
| Scaling | No | | | | | | |
| User adjustment | No | | | | | | |
| Last maintenance date | Yes | | | | | | |
| Cumulative counter | No | | | | | | |
| Moving average | No | | | | | | |
| Setting the number of AD conversion points | No | | | | | | |
| Peak/bottom hold | No | | | | | | |
| Top/valley hold | No | | | | | | |
| Rate of change | No | | | | | | |
| Comparator | No | | | | | | |
| Communications error output | No | | | | | | |

**Note**
1. The Operation Time Monitor cannot be used with the DRT2-□D08(-1).
2. The DRT2-□D08(-1) and DRT2-MD16(-1) cannot be expanded with an Expansion Unit.
3. The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

Yes: Supported.; No: Not supported.

| Type / Feature | General-purpose Slaves: Sensor Connector Terminals | | | | |
|---|---|---|---|---|---|
| | Sensor connectors | | MIL connectors (Board Terminals) | | |
| **Feature** | **Input** | **Mix** | **Input** | **Output** | **Mix** |
| Operation Time Monitor | No | Yes | Yes | | |
| Contact Operation Counter | Yes | | | | |
| Unit ON Time Monitor | Yes | | | | |
| Total ON Time Monitor | Yes | | | | |
| Naming Units | Yes | | | | |
| Naming connected devices | Yes | | | | |
| Network Power Voltage Monitor | Yes | | | | |
| I/O Power Status Monitor | No | | Yes | | |
| Communications Error History Monitor | Yes | | | | |
| Input filter | Yes | | Yes | No | Yes |
| Preventing malfunctions caused by inrush current at startup | Yes | | Yes | No | Yes |
| Sensor power short-circuit detection | Yes | | No | | |
| Sensor disconnected detection | No | | | | |
| External load short-circuit detection | No | Yes | No | | |
| External load disconnected detection | No | | | | |
| Detachable terminal block construction | No | | | | |
| Automatic baud rate detection | Yes | | | | |
| Power supply wiring not required for Units | Yes | | | | |
| Power supply wiring not required for input devices | Yes | | No | | |
| Expansion using Expansion Units | No | | | | |
| Scaling | No | | | | |
| User adjustment | No | | | | |
| Last maintenance date | Yes | | | | |
| Cumulative counter | No | | | | |
| Moving average | No | | | | |
| Setting the number of AD conversion points | No | | | | |
| Peak/bottom hold | No | | | | |
| Top/valley hold | No | | | | |
| Rate of change | No | | | | |
| Comparator | No | | | | |
| Communications error output | No | | | | |

**Note** The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

Yes: Supported.; No: Not supported.

| Type | General-purpose Slaves | | | |
|---|---|---|---|---|
| | Screw-less Clamp Terminals | | | |
| | DRT2-□D16SLH (With detection function) | | DRT2-□D16SL (Without detection function) | |
| **Feature** | **Input** | **Output** | **Input** | **Output** |
| Operation Time Monitor | Yes | | | |
| Contact Operation Counter | Yes | | | |
| Unit ON Time Monitor | Yes | | | |
| Total ON Time Monitor | Yes | | | |
| Naming Units | Yes | | | |
| Naming connected devices | Yes | | | |
| Network Power Voltage Monitor | Yes | | | |
| I/O Power Status Monitor | Yes | | | |
| Communications Error History Monitor | Yes | | | |
| Input filter | Yes | No | Yes | No |
| Preventing malfunctions caused by inrush current at startup | Yes | No | Yes | No |
| Sensor power short-circuit detection | Yes | No | No | |
| Sensor disconnected detection | Yes | No | No | |
| External load short-circuit detection | No | Yes | No | |
| External load disconnected detection | No | Yes | No | |
| Detachable terminal block construction | Yes | | | |
| Automatic baud rate detection | Yes | | | |
| Power supply wiring not required for Units | Yes | | | |
| Power supply wiring not required for input devices | No | | | |
| Expansion using Expansion Units | No | | | |
| Scaling | No | | | |
| User adjustment | No | | | |
| Last maintenance date | Yes | | | |
| Cumulative counter | No | | | |
| Moving average | No | | | |
| Setting the number of AD conversion points | No | | | |
| Peak/bottom hold | No | | | |
| Top/valley hold | No | | | |
| Rate of change | No | | | |
| Comparator | No | | | |
| Communications error output | No | | | |

The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

Yes: Supported.; No: Not supported.

| Type | General-purpose Slaves | | | | | |
|---|---|---|---|---|---|---|
| | Screw-less Clamp Terminals | | | | | |
| | DRT2-□D32SLH (With detection function) | | | DRT2-□D32SL (Without detection function) | | |
| **Feature** | **Input** | **Output** | **Mix** | **Input** | **Output** | **Mix** |
| Operation Time Monitor | Yes | | | Yes | | |
| Contact Operation Counter | Yes | | | | | |
| Unit ON Time Monitor | Yes | | | | | |
| Total ON Time Monitor | Yes | | | | | |
| Naming Units | Yes | | | | | |
| Naming connected devices | Yes | | | | | |
| Network Power Voltage Monitor | Yes | | | | | |
| I/O Power Status Monitor | Yes | | | | | |
| Communications Error History Monitor | Yes | | | | | |
| Input filter | Yes | No | Yes | Yes | No | Yes |
| Preventing malfunctions caused by inrush current at startup | Yes | No | Yes | Yes | No | Yes |
| Sensor power short-circuit detection | Yes | No | Yes | No | | |
| Sensor disconnected detection | Yes | No | Yes | No | | |
| External load short-circuit detection | No | Yes (See note 1.) | Yes (See note 1.) | No | | |
| External load disconnected detection | No | Yes | Yes | No | | |
| Detachable terminal block construction | Yes | | | | | |
| Automatic baud rate detection | Yes | | | | | |
| Power supply wiring not required for Units | Yes | | | | | |
| Power supply wiring not required for input devices | No | | | | | |
| Expansion using Expansion Units | No | | | | | |
| Scaling | No | | | | | |
| User adjustment | No | | | | | |
| Last maintenance date | Yes | | | | | |
| Cumulative counter | No | | | | | |
| Moving average | No | | | | | |
| Setting the number of AD conversion points | No | | | | | |
| Peak/bottom hold | No | | | | | |
| Top/valley hold | No | | | | | |
| Rate of change | No | | | | | |
| Comparator | No | | | | | |
| Communications error output | No | | | | | |

**Note**
1. The DRT2-OD32SLH-1 and DRT2-MD32SLH-1 support External Load Short-circuit Detection starting with unit version 2.0.
2. The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

Yes: Supported.; No: Not supported.

| Type / Feature | Environment-resistive Terminals | | | | |
|---|---|---|---|---|---|
| | Advanced models | | Standard models | | |
| | Input | Output | Input | Output | Mix |
| Operation Time Monitor | No | No | No (See note.) | | Yes |
| Contact Operation Counter | Yes | Yes | Yes | Yes | Yes |
| Unit ON Time Monitor | Yes | Yes | Yes | Yes | Yes |
| Total ON Time Monitor | Yes | Yes | Yes | Yes | Yes |
| Naming Units | Yes | Yes | Yes | Yes | Yes |
| Naming connected devices | Yes | Yes | Yes | Yes | Yes |
| Network Power Voltage Monitor | Yes | Yes | Yes | Yes | Yes |
| I/O Power Status Monitor | No | Yes | Yes | Yes | Yes |
| Communications Error History Monitor | Yes | Yes | Yes | Yes | Yes |
| Input filter | Yes | No | Yes | No | Yes |
| Preventing malfunctions caused by inrush current at startup | Yes | No | Yes | No | Yes |
| Sensor power short-circuit detection | Yes | No | No | No | No |
| Sensor disconnected detection | Yes | No | No | No | No |
| External load short-circuit detection | No | Yes | No | No | No |
| External load disconnected detection | No | No | No | No | No |
| Detachable terminal block construction | No | No | No | No | No |
| Automatic baud rate detection | Yes | Yes | Yes | Yes | Yes |
| Power supply wiring not required for Units | Yes | Yes | Yes | Yes | Yes |
| Power supply wiring not required for input devices | Yes | No | No | No | No |
| Expansion using Expansion Units | No | No | No | No | No |
| Scaling | No | No | No | No | No |
| User adjustment | No | No | No | No | No |
| Last maintenance date | Yes | Yes | Yes | Yes | Yes |
| Cumulative counter | No | No | No | No | No |
| Moving average | No | No | No | No | No |
| Setting the number of AD conversion points | No | No | No | No | No |
| Peak/bottom hold | No | No | No | No | No |
| Top/valley hold | No | No | No | No | No |
| Rate of change | No | No | No | No | No |
| Comparator | No | No | No | No | No |
| Communications error output | No | No | No | No | No |
| Top/valley count function | No | No | No | No | No |
| Temperature range timing function | No | No | No | No | No |
| Input temperature variation detection function | No | No | No | No | No |

**Note**
1. The Operation Time Monitor can be used with the DRT2-□D04CL(-1).
2. The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

Yes: Supported.; No: Not supported.

| Type | Analog Slaves | | | |
|---|---|---|---|---|
| | Analog Terminals | | | Tempera-ture Input Terminal |
| | DRT2-AD04 | DRT2-AD04H | DRT2-DA02 | |
| **Feature** | **Input** | | **Output** | **Input** |
| Operation Time Monitor | No | No | No | No |
| Contact Operation Counter | No | No | No | No |
| Unit ON Time Monitor | Yes | Yes | Yes | Yes |
| Total ON Time Monitor | No | No | No | No |
| Naming Units | Yes | Yes | Yes | Yes |
| Naming connected devices | Yes | Yes | Yes | Yes |
| Network Power Voltage Monitor | Yes | Yes | Yes | Yes |
| I/O Power Status Monitor | No | No | No | No |
| Communications Error History Monitor | Yes | Yes | Yes | Yes |
| Input filter | No | No | No | No |
| Preventing malfunctions caused by inrush current at startup | No | No | No | No |
| Sensor power short-circuit detection | No | No | No | No |
| Sensor disconnected detection | No | No | No | No |
| External load short-circuit detection | No | No | No | No |
| External load disconnected detection | No | No | No | No |
| Detachable terminal block construction | Yes | Yes | Yes | Yes |
| Automatic baud rate detection | Yes | Yes | Yes | Yes |
| Power supply wiring not required for Units | Yes | Yes | Yes | Yes |
| Power supply wiring not required for input devices | No | No | No | No |
| Expansion using Expansion Units | No | No | No | No |
| Scaling | Yes | Yes | Yes | Yes |
| User adjustment | Yes | Yes | Yes | Yes |
| Last maintenance date | Yes | Yes | Yes | Yes |
| Cumulative counter | Yes | Yes | Yes | Yes |
| Moving average | Yes | Yes | No | Yes |
| Setting the number of AD conversion points | Yes | No | No | No |
| Peak/bottom hold | Yes | Yes | No | Yes |
| Top/valley hold | Yes | Yes | No | Yes |
| Rate of change | Yes | Yes | No | Yes |
| Comparator | Yes | Yes | No | Yes |
| Communications error output | No | No | Yes | No |
| Top/valley count function | No | No | No | Yes |
| Temperature range timing function | No | No | No | Yes |
| Input temperature variation detection function | No | No | No | Yes |

**Note** The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for the same contact.

## 1-2-5 Installing and Connecting Slaves

| Slave type | Communi-cations cables | Name | Model | Slave installation | I/O con-nection method | Internal power sup-ply | I/O power supply |
|---|---|---|---|---|---|---|---|
| General-purpose Slaves | Standard rectangular connector | Remote I/O Terminals with Transistors | DRT2-ID08 | DIN Track | M3 terminal block (detachable) | Shares communications power supply. | Requires external power supply. |
| | | | DRT2-ID08-1 | | | | |
| | | | DRT2-OD08 | | | | |
| | | | DRT2-OD08-1 | | | | |
| | | | DRT2-ID16 | | | | |
| | | | DRT2-ID16-1 | | | | |
| | | | DRT2-OD16 | | | | |
| | | | DRT2-OD16-1 | | | | |
| | | | DRT2-MD16 | | | | |
| | | | DRT2-MD16-1 | | | | |
| | | Remote I/O Terminals with 3-tier Terminal Blocks and Transistors | DRT2-ID16TA | DIN Track or screws | | | |
| | | | DRT2-ID16TA-1 | | | | |
| | | | DRT2-OD16TA | | | | |
| | | | DRT2-OD16TA-1 | | | | |
| | | | DRT2-MD16TA | | | | |
| | | | DRT2-MD16TA-1 | | | | |
| | | Remote I/O Terminal Expansion Units with Transistors | XWT-ID16 | DIN Track | | | See note. |
| | | | XWT-ID16-1 | | | | |
| | | | XWT-OD16 | | | | |
| | | | XWT-OD16-1 | | | | |
| | | | XWT-ID08 | | | | |
| | | | XWT-ID08-1 | | | | |
| | | | XWT-OD08 | | | | |
| | | | XWT-OD08-1 | | | | |
| | | Remote I/O Terminal with Relay Outputs | DRT2-ROS16 | | Relay | | Shares communications power supply. An external power supply is required, however, for MD16S-1 outputs. |
| | | Sensor Connector Terminals with Transistors | DRT2-ID16S | DIN Track or screws | Industry standard connector | | |
| | | | DRT2-ID16S-1 | | | | |
| | | | DRT2-MD16S | | | | |
| | | | DRT2-MD16S-1 | | | | |
| | | MIL Connector Terminals with Transistors | DRT2-ID16ML | DIN Track or screws with Mounting Bracket | MIL connector | Shares communications power supply. | Requires external power supply. |
| | | | DRT2-ID16ML-1 | | | | |
| | | | DRT2-OD16ML | | | | |
| | | | DRT2-OD16ML-1 | | | | |
| | | | DRT2-ID16MLX | | | | |
| | | | DRT2-ID16MLX-1 | | | | |
| | | | DRT2-OD16MLX | | | | |
| | | | DRT2-OD16MLX-1 | | | | |

| Slave type | Communi-cations cables | Name | Model | Slave installation | I/O con-nection method | Internal power sup-ply | I/O power supply |
|---|---|---|---|---|---|---|---|
| General-pur-pose Slaves | Standard rectangular connector | MIL Connec-tor Terminals with Transis-tors | DRT2-ID32ML | DIN Track or screws with Mount-ing Bracket | MIL con-nector | Shares communi-cations power sup-ply. | Requires external power sup-ply. |
| | | | DRT2-ID32ML-1 | | | | |
| | | | DRT2-OD32ML | | | | |
| | | | DRT2-OD32ML-1 | | | | |
| | | | DRT2-MD32ML | | | | |
| | | | DRT2-MD32ML-1 | | | | |
| | | Board MIL Connector Terminals with Transis-tors | DRT2-ID32B | Screws | | | |
| | | | DRT2-ID32B-1 | | | | |
| | | | DRT2-OD32B | | | | |
| | | | DRT2-OD32B-1 | | | | |
| | | | DRT2-MD32B | | | | |
| | | | DRT2-MD32B-1 | | | | |
| | | | DRT2-ID32BV | | | | |
| | | | DRT2-ID32BV-1 | | | | |
| | | | DRT2-OD32BV | | | | |
| | | | DRT2-OD32BV-1 | | | | |
| | | | DRT2-MD32BV | | | | |
| | | | DRT2-MD32BV-1 | | | | |
| | | Screw-less Clamp Termi-nal with Tran-sistors | DRT2-ID16SL | DIN Track | Screw-less clamp | | |
| | | | DRT2-ID16SL-1 | | | | |
| | | | DRT2-OD16SL | | | | |
| | | | DRT2-OD16SL-1 | | | | |
| | | | DRT2-ID32SL | | | | |
| | | | DRT2-ID32SL-1 | | | | |
| | | | DRT2-OD32SL | | | | |
| | | | DRT2-OD32SL-1 | | | | |
| | | | DRT2-MD32SL | | | | |
| | | | DRT2MD32SL-1 | | | | |
| | | | DRT2-ID16SLH | | | | |
| | | | DRT2-ID16SLH-1 | | | | |
| | | | DRT2-OD16SLH | | | | |
| | | | DRT2-OD16SLH-1 | | | | |
| | | | DRT2-ID32SLH | | | | |
| | | | DRT2-ID32SLH-1 | | | | |
| | | | DRT2-OD32SLH | | | | |
| | | | DRT2-OD32SLH-1 | | | | |
| | | | DRT2-MD32SLH | | | | |
| | | | DRT2-MD32SLH-1 | | | | |

**Note** Use the following table to determine the I/O power supply for the Expansion Unit.

| Device combination | I/O power supply to Expansion Unit |
|---|---|
| Basic Input Unit (IN) + Expansion Input Unit (IN):<br>Example: DRT2-ID16+XWT-ID16 | Not required. (I/O power supply shared with Basic Unit.) |
| Basic Input Unit (IN) + Expansion Output Unit (OUT):<br>Example: DRT2-ID16+XWT-OD16 | Required. (I/O power supply required for both Units.) |

| Device combination | I/O power supply to Expansion Unit |
|---|---|
| Basic Output Unit (OUT) + Expansion Input Unit (IN):<br>Example: DRT2-OD16+XWT-ID16 | Required. (I/O power supply required for both Units.) |
| Basic Output Unit (OUT) + Expansion Output Unit (OUT):<br>Example: DRT2-OD16+XWT-OD16 | Required. (I/O power supply required for both Units.) |
| Basic Output Unit (OUT) + Expansion Output Unit (IN):<br>Example: DRT2-ROS16+XWT-ID16 | Required. (I/O power supply required for Expansion Unit only.) |
| Basic Output Unit (OUT) + Expansion Output Unit (OUT):<br>Example: DRT2-ROS16+XWT-OD16 | Required. (I/O power supply required for Expansion Unit only) |

| Slave type | Communications cables | Name | Model | Slave installation | I/O connection method | Connecting devices | Internal power supply | I/O power supply |
|---|---|---|---|---|---|---|---|---|
| Environment-resistive Slaves | Round communications connector | Environment-resistive Terminals | DRT2-ID08C | Screw-mounted | Round water-proof connector (for XS2) | Cable with XS2 Connector + Sensor with Connector | Shares communications power supply | Shares communications power supply |
| | | | DRT2-ID08C-1 | | | | | |
| | | | DRT2-HD16C | | | | | |
| | | | DRT2-HD16C-1 | | | | | |
| | | | DRT2-OD08C | | | | | Requires external power supply.<br>Connected with XS4□ connector. |
| | | | DRT2-OD08C-1 | | | | | |
| | | | DRT2-ID04CL | | | | | |
| | | | DRT2-ID04CL-1 | | | | | |
| | | | DRT2-OD04CL | | | | | |
| | | | DRT2-OD04CL-1 | | | | | |
| | | | DRT2-ID08CL | | | | | |
| | | | DRT2-ID08CL-1 | | | | | |
| | | | DRT2-HD16CL | | | | | |
| | | | DRT2-HD16CL-1 | | | | | |
| | | | DRT2-OD08CL | | | | | |
| | | | DRT2-OD08CL-1 | | | | | |
| | | | DRT2-WD16CL | | | | | |
| | | | DRT2-WD16CL-1 | | | | | |
| | | | DRT2-MD16CL | | | | | |
| | | | DRT2-MD16CL-1 | | | | | |
| Analog Slaves | Standard rectangular connector | Analog Terminals | DRT2-AD04 | DIN Track | M3 terminal block (detachable) | Terminal block connection | | Separate power supply required for connected devices, such as sensors and actuators. |
| | | | DRT2-AD04H | | | | | |
| | | | DRT2-DA02 | | | | | |
| | | Temperature Input Terminals | DRT2-TS04T | | | | | |
| | | | DRT2-TS04P | | | | | |

# SECTION 2
# Example System Startup

This section provides information on hardware aspects of Masters and Slaves connected to a DeviceNet Network to ensure the proper operation of the system. Included are system configuration examples, basic procedures for wiring, details on mounting and setting Master and Slave Units, procedures for connecting cables and power supplies, creating I/O tables, creating and registering scan lists, and checking operation of the system.

# 2-1 Basic Procedures and Configuration Examples

The examples shown here provide the basic operating procedures for DeviceNet.

## 2-1-1 Basic Procedures

The basic application procedures are as follows: For details on settings and connections, refer to the operation manual for the Master Unit. For further details on Slave Units, refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves*.

### Preparing the Units

***1,2,3...***
1. Select the appropriate Units. Refer to page 23.
2. Determine the appropriate wiring method. Refer to page 23.
3. Determine the appropriate method for supplying communications power. Refer to page 23.

### Setting and Wiring Hardware

***1,2,3...***
1. Separate and lay the cables.
2. Mount the Master Unit and specify the correct settings. Refer to page 24.
3. Mount the Slave Units and specify the correct settings. Refer to page 25.
4. Mount other devices to be connected to the Network. Refer to page 26.
5. Connect the cables. Refer to page 27.
6. Wire the I/O cables. Refer to page 27.

### Starting Communications

***1,2,3...***
1. Create the I/O tables. Refer to page 28.
2. Start up the system. Refer to page 28.
3. Create and register the scan list. Refer to page 29.

### Checking Operations

***1,2,3...***
1. Check the status of the indicators on the Unit. Refer to page 30.
2. Check that data is reading and writing properly. Refer to page 30.

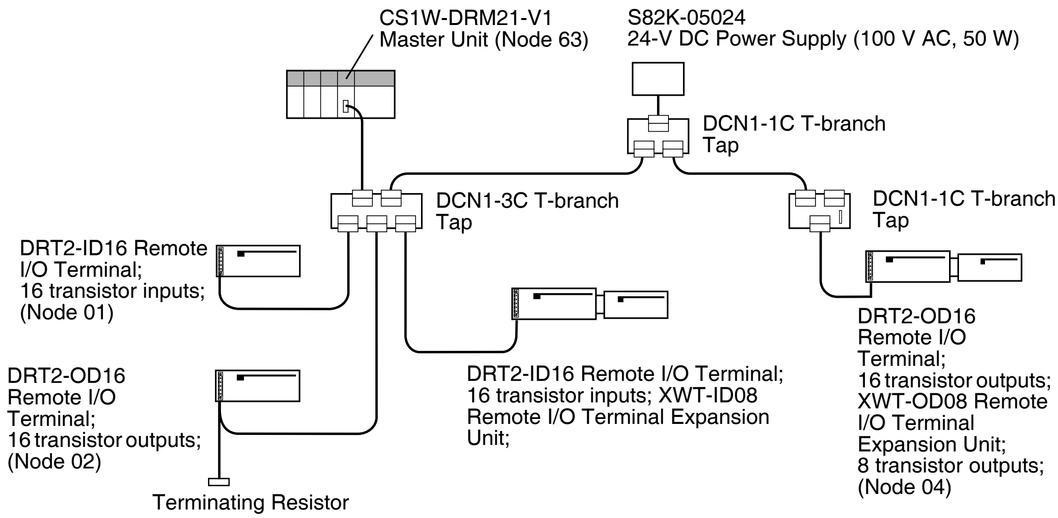
**Note** The examples provided in this section show the minimum settings to operate the system. If details on other settings for actual operation are required, refer to the operation manual for the Master Unit. For further details on Slave Units, refer to *SECTION 5 General-purpose Slaves* and *SECTION 7 Analog Slaves*.

## 2-1-2 System Configuration Example

The following diagram shows the operating procedure using a system configuration example.

The system configuration shown here uses Thin Cables.

The following diagram is simplified, so it does not include the separate I/O power supply that must be provided to the Output Unit (or Expansion Output Unit).




# 2-2 Preparations

## 2-2-1 Selecting Units

Select the following Units as shown in *2-1-2 System Configuration Example*.

Master Unit: CS1W-DRM21-V1

Slave Units: DRT2-ID16 + XWT-ID08
DRT2-OD16 + XWT-OD08

There is a complete line of OMRON Master Units and Slave Units available that are compatible with DeviceNet. Select Units that suit the needs of the system.

## 2-2-2 Wiring

Either Thick Cables or Thin Cables can be used to wire a DeviceNet Network.

Flexible branching of cables is possible by using either T-branch Taps or multi-drop connections.

Restrictions on the maximum network length and total branch line length depend on the baud rate and type of cable used. For details on network configurations and specifications, refer to the DeviceNet Operation Manual (W267).

## 2-2-3 Communications Power Supply

Each node (Master or Slave) must be supplied with a 24-V DC power supply for proper DeviceNet communications.

The communications power, however, can be supplied by communications cables and does not require separate wiring.

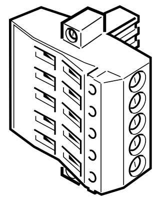
For systems that have a short maximum network length, power can be supplied to all nodes by using one communications power supply.

Various conditions, constraints, and measures affect how the communications power is supplied. In the examples shown here, the power is supplied from one communications power supply, and communications cables are connected using T-branch Taps.

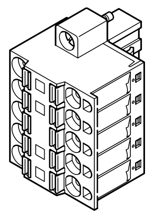
For details on methods of supplying communications power, refer to the DeviceNet Operation Manual (W267).

**Note** Use the OMRON Connectors shown below when using Thick Cables and multi-drop connections for wiring.

XW4B-05C4-TF-D (With set screws)



XW4G-05C4-TD-D (With set screws)



# 2-3 Setting and Wiring Hardware

Use the following procedures to mount, set, and wire the hardware.

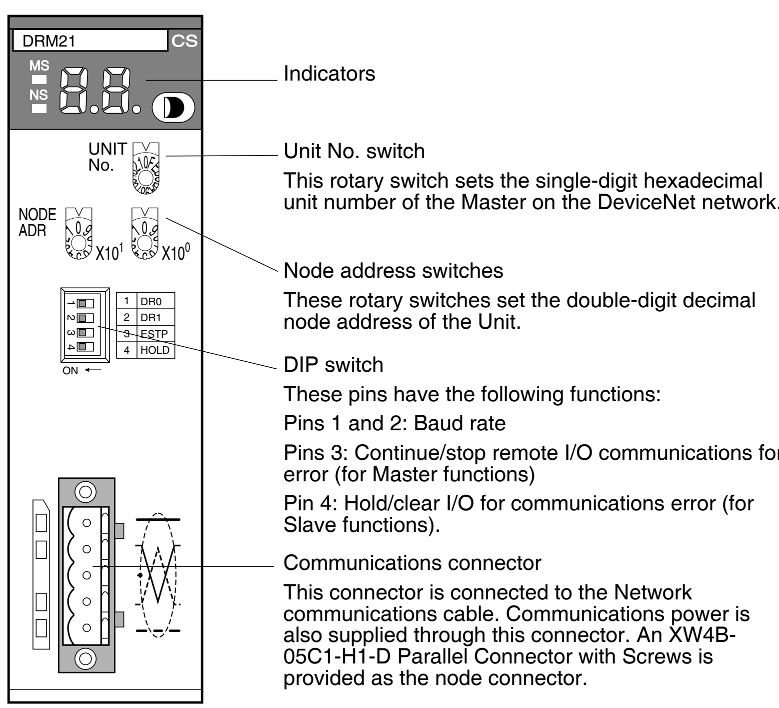
## 2-3-1 Mounting and Setting the Master Unit

### Settings

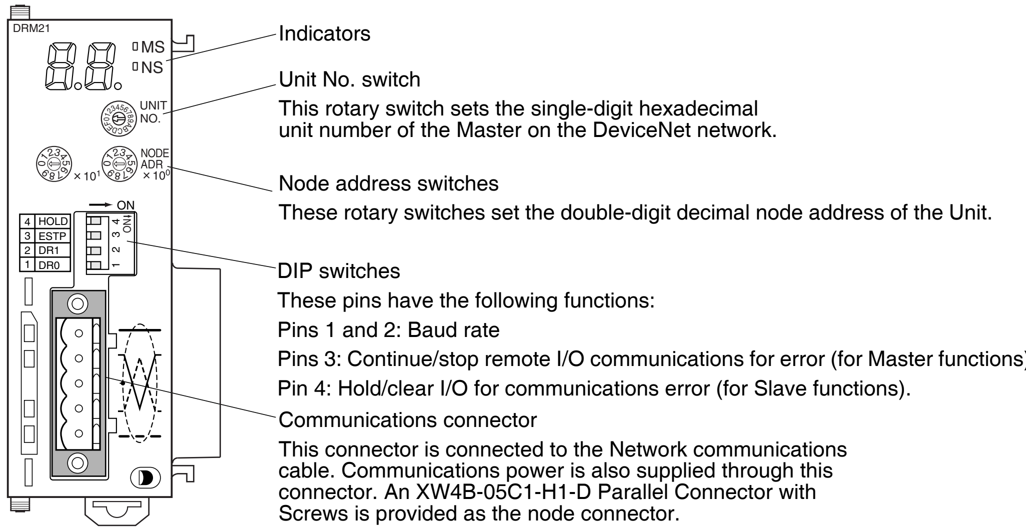
The components, functions, and switch settings for the CS1W-DRM21, CS1W-DRM21-V1 or CJ1W-DRM21 Master Unit mounted to a CS/CJ-series PLC are shown as an example in the following diagram.

For information on switch settings, refer to the operation manual for the Master Unit.

### CS1W-DRM21 (-V1)



## CJ1W-DRM21




### Mounting

The Master Unit is mounted to the Backplane of the PLC in the same way as other Units are normally mounted. CJ-series Master Units have no Backplane, so connect the Units together by joining the connectors. For details on mounting Master Units to PLCs, and PLCs to control panels, refer to the applicable PLC Operation Manual.

## 2-3-2 Mounting and Setting Slaves

### Settings

The following example shows Slave settings. For details on how to set Slaves, refer to *SECTION 5 General-purpose Slaves* to *SECTION 7 Analog Slaves*.

- DRT2-ID16 Remote I/O Terminals (transistor inputs)
  Node address: 01
- DRT2-OD16 Remote I/O Terminals (transistor outputs)
  Node address: 02
- DRT2-ID16 Remote I/O Terminals (transistor inputs)
  XWT-ID08 Remote I/O Terminal Expansion Unit
  Node address: 03
- DRT2-OD16 Remote I/O Terminals (transistor outputs)
  XWT-OD08 Remote I/O Terminal Expansion Unit
  Node address: 04

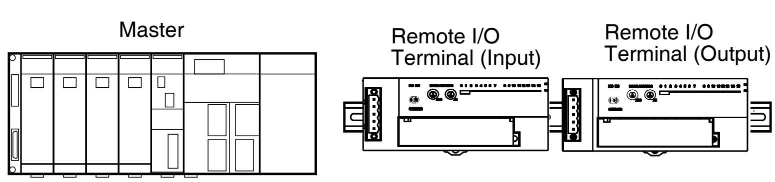
### Mounting

Remote I/O Terminals are mounted by fixing to a DIN Track, as shown in the following example.

Secure the bottom of the Slave Unit to a 35-mm DIN Track, or secure the Slave Unit to the track between two End Plates.

**Mounting Example**

The following diagram shows all Units except the PLC node mounted to DIN Tracks.

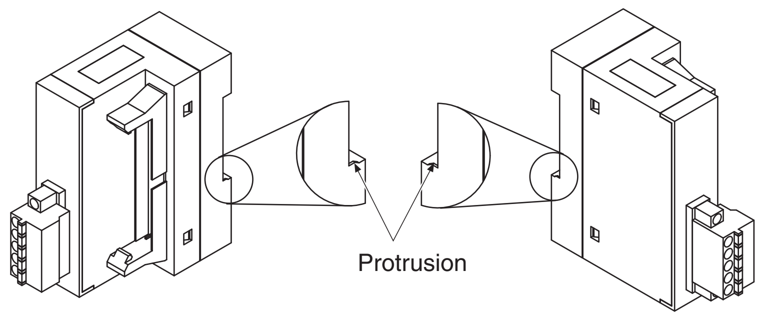


**Note** The DIN rail mounting part on the back of the Unit has the protrusion indicated below. This protrusion prevents the Unit from slipping to the side when mounting on the DIN rail.

The following models of the Unit have this function.

Digital I/O Slave MIL Connector DRT2-□ DML(X)(-1)

**Example: For DRT2-ID32ML**




## 2-3-3 Mounting Connecting Devices

The following connecting devices require being mounted:

- T-branch Taps: Secure to the control panel with screws, or mount to a DIN Track.
- Terminal-block Terminating Resistors: Secure to the control panel with screws.

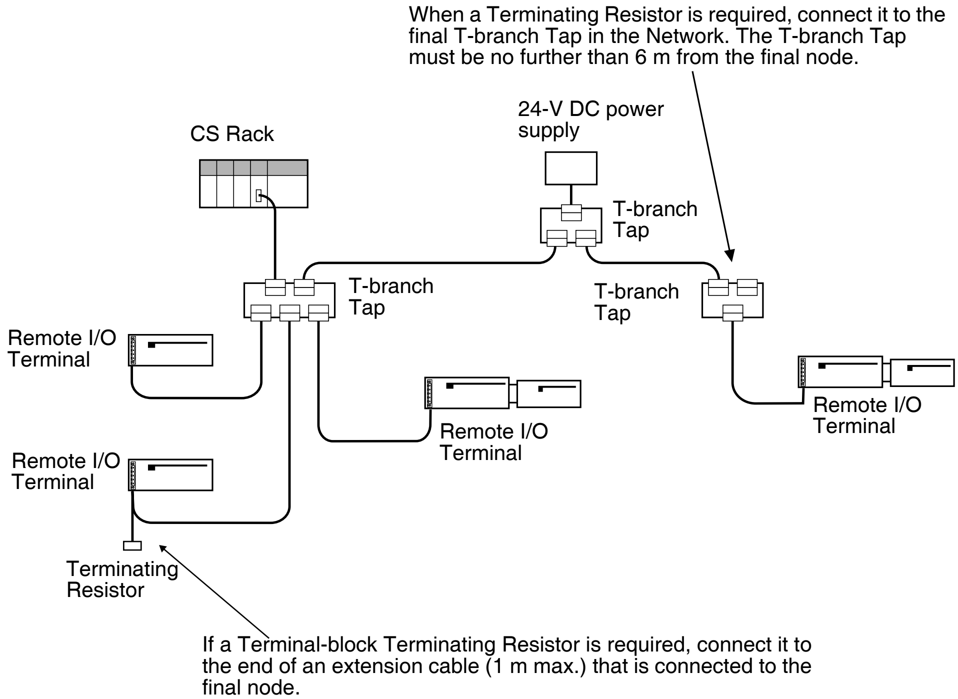
**⚠ Caution**

Do not install the Unit that has relay outputs on the locations that always subject to vibration. It may cause a failure or malfunction.

### 2-3-4 Connecting Cables

**Connecting Communications Cables**

Connect the Master Unit and T-branch Taps, T-branch Taps and T-branch Taps, and T-branch Taps and Slaves using Thin DeviceNet Communications Cables, as shown in the following diagram.




Use the following procedure to connect the cables. Refer to *5-2 Connecting Communications Cables to General-purpose Slaves* for details.

***1,2,3...***

1. Prepare the communications cables and attach the connectors to the cables.
2. Connect the communications cable connectors to the node connectors on the Master Unit, T-branch Taps, and Slaves.

**Wiring the I/O Power Supply**

If required, an I/O power supply for I/O devices is connected to the Remote I/O Terminals. Connect M3 crimp terminals to the power lines and then connect them to the terminal block.

**Wiring I/O**

Wire the I/O to the Remote I/O Terminals.

Connect M3 crimp terminals to the signal lines and then connect them to the terminal block.

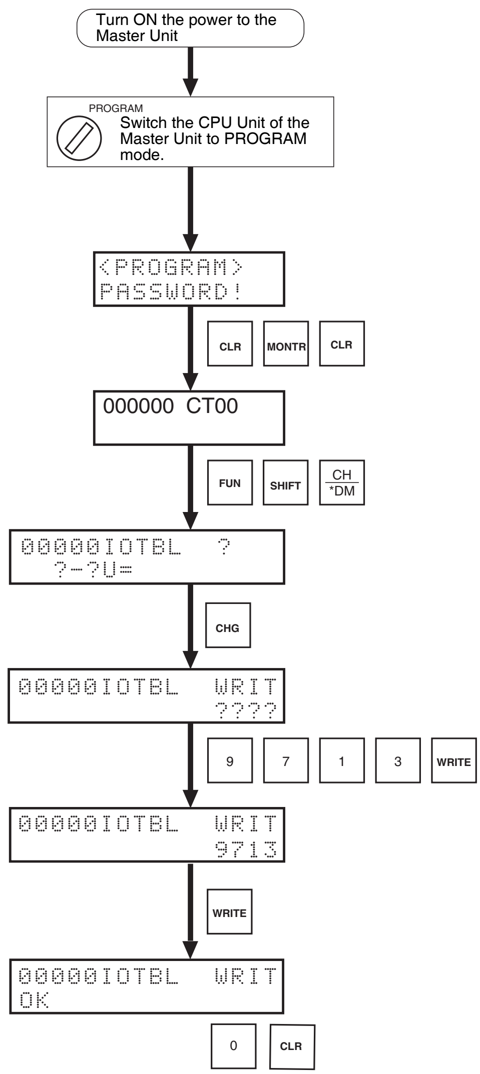
## 2-4 Starting Communications

After setting and wiring the hardware, turn ON the communications power supply, the internal power supply of each node, and the I/O power supply, and then start communications using the following procedure.

## 2-4-1 Creating I/O Tables for the Master Unit

I/O tables must be created in the CPU Unit to distinguish between the different Slaves mounted to the PLC. Turn ON the PLC to which the Master Unit is mounted, connect the Peripheral Devices to the PLC, and create the I/O tables. After the I/O tables have been created, turn OFF the power to the PLC.

The following example shows the procedure for creating I/O tables using a Programming Console. For details on creating I/O tables, refer to the operation manual for the Peripheral Device being used.




## 2-4-2 Starting the System

Turn ON the communications power supply and the power to other nodes in the following order.

***1,2,3...***
1. Turn ON the communications power supply.
2. Turn ON the power to each Slave.
3. Turn ON the power to the Master Unit.

**Note** The power supplies listed above can all be turned ON simultaneously. The external I/O power supply can be turned ON at any time.

## 2-4-3 Creating and Registering Scan Lists

Scan lists are lists that register the information that is transferred between Master Units and Slaves. The Master Unit compares the scan list with the status of the Slave currently being communicated with, so communications with the Slave are always being checked.

For details on scan lists and remote I/O communications, refer to the operation manual for the Master Unit.

**Note** When a scan list is disabled, communications are possible with all Slaves on the DeviceNet Network with fixed allocations. Without scan lists, however, the Master Unit cannot check if there is an error in a Slave.
For normal operations, always enable the scan lists.

### Precautions

**User I/O Allocations**

The user can allocate any words for Slave I/O for the DeviceNet I/O Areas (IN Area, OUT Area) in the Master Unit.

When user allocations are used, scan lists must be created with a DeviceNet Configurator and registered in the Master Unit. The scan list is enabled as soon as it is registered, and remote I/O communications start according to the scan list.

For details, refer to the DeviceNet Operation Manual (W267) and the DeviceNet Configurator Operation Manual (W328).

**Fixed I/O Allocations**

Slave I/O is allocated in the DeviceNet I/O area (IN Area, OUT Area) in the Master Unit in the same order as the Slave node addresses.

When fixed allocations are used, the scan lists are automatically created and registered using the Master Unit's software switches. The scan list is enabled as soon as it is registered, and remote I/O communications start according to the scan list. When scan list is enabled, the mode is called the scan list-enabled mode.

The registered scan lists can be cleared using the software switches. When scan lists are cleared (disabled), the mode is called the scan list-disabled mode.

### Creating and Registering Fixed Allocation Scan Lists

The method of creating and registering scan lists for fixed allocation using Programming Console and a CS/CJ-series Master Unit is explained here. For details on operating Peripheral Devices, refer to the operation manual for the Peripheral Device being used with the PLC. For details on creating scan lists, refer to the operation manual for the Master Unit.

**Creating and Registering Scan Lists**

Use the following procedure to create, register, and enable the scan lists.

In the following example, n = 1500 + (25 × unit number).

**Clearing and Creating Scan Lists**

Switch the operating mode switch to PROGRAM mode.

Enable the Master Unit functions. Set the Master Unit function enable switch (bit 06 of word n) from OFF to ON.

Clear the scan lists. Set the scan list clear switch (bit 01 of word n) from OFF to ON.

Select the fixed allocation areas 1 to 3. Set the Master Unit's setting switch for fixed allocation areas 1 to 3 (bit 00 of word n) from OFF to ON.

Enable the scan lists. Set the scan list enable switch (bit 00 of word n) from OFF to ON.

Switch the operating mode switch to RUN or MONITOR mode.

**Checking the Normal Slave Table**

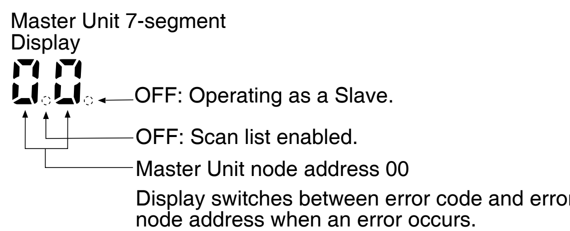
Monitor the normal Slave table and check that the corresponding bits are ON. In the normal Slave table, the corresponding bits will turn ON for the nodes that are communicating normally.

# 2-5 Checking Operation

Use the procedures provided here to check that I/O communications are operating normally.

## 2-5-1 Indicator Status

I/O communications are operating normally if the MS and NS indicators for all nodes are lit green, and the 7-segment indicator on the front panel of the Master Unit is displaying the node address of the Master Unit as shown in the following diagram (when the Master Unit's node address is 00), and the scan list is enabled.



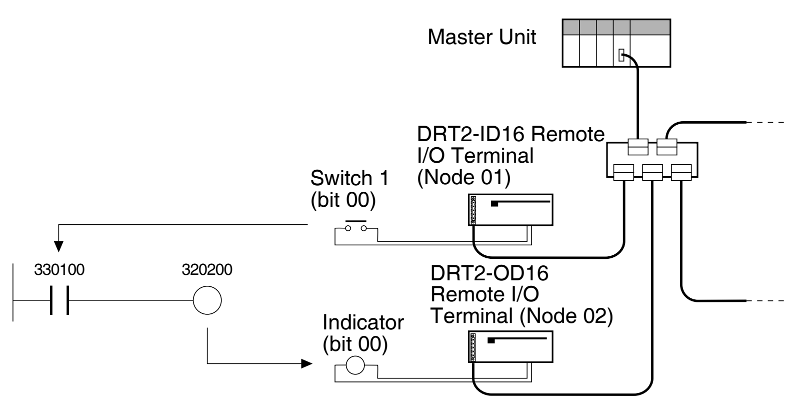

## 2-5-2 Reading and Writing Data

Connect the Peripheral Device for the PLC to the Master Unit, write the Master Unit's OUT Area and read the IN Area, and check that the data are the same in the Slaves.

Refer to the operation manual for the Master Unit for details on OUT Area and IN Area addresses and how to allocate Slave I/O.

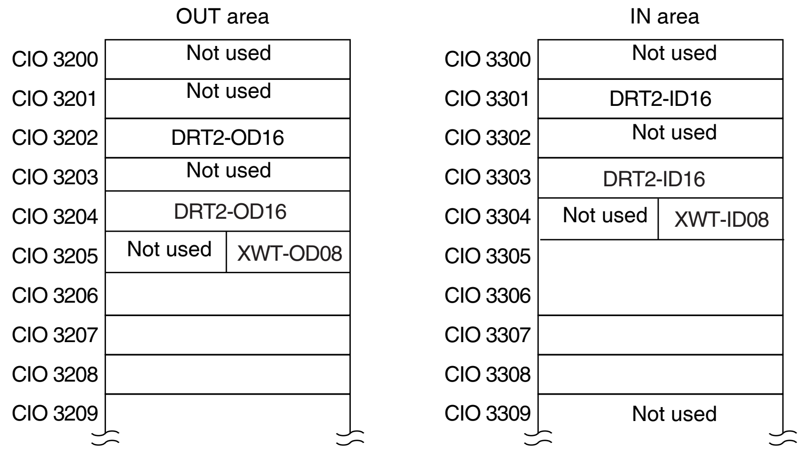
**I/O between Remote I/O Terminals**

Create ladder programs in the PLC of the Master Unit, and check that when the switch on the DRT2-ID16 Input Terminal turns ON, the indicator on the DRT2-OD16 Output Terminal is ON.



## Precautions

In the system configuration examples in this section, Slave I/O is allocated in the Master Unit's CIO Area for fixed remote I/O communications as shown in the following diagram.



# SECTION 3
# Common Slave Specifications

This section provides specifications and indicator displays that are common to all Slaves. The allocation of remote I/O memory for Smart Slaves is also described here.

# 3-1 Common Slave Specifications

## 3-1-1 Communications Specifications

| Item | Specifications | | | |
|---|---|---|---|---|
| Communications protocol | DeviceNet | | | |
| Supported connections (communications) | Remote I/O: Master-Slave connection (Poll/Bit-Strobe/COS/Cyclic)<br>Conform to DeviceNet specifications. | | | |
| Connection forms | Combination of multi-drop and T-branch connections (for trunk or branch lines) | | | |
| Baud rate | 500 kbps, 250 kbps, or 125 kbps | | | |
| Communications media | Special 5-wire cables (2 signal lines, 2 power lines, 1 shield line) | | | |
| Communications distances | Baud rate | Network length | Branch line length | Total branch line length |
| | 500 kbps | 100 m max (100 m max) | 6 m max. | 39 m max. |
| | 250 kbps | 250 m max (100 m max) | 6 m max. | 78 m max. |
| | 125 kbps | 500 m max (100 m max) | 6 m max. | 156 m max. |
| | Values in parentheses indicate the length when Thin Cables are used. | | | |
| Communications power supply | 11 to 25 V DC | | | |
| Max. number of nodes | 64 nodes (including Configurator when used) | | | |
| Max. number of Slaves | 63 Slaves | | | |
| Communications cycle time | Without Configurator: 16 Input Slaves (16-pt)<br>16 Output Slaves (16-pt)<br>Baud rate of 500 kbps:<br>Cycle time: 9.3 ms | | | |
| Error control | CRC error check | | | |

## 3-1-2 MS and NS Indicators

This section describes the meanings of MS and NS indicators for the Slave Units.

The MS (Module Status) indicator displays the status of a node on the network.

The NS (Network Status) indicator displays the status of the entire network.

The MS and NS indicators can be green or red and they can be ON, flashing, or OFF.

| Indicator | Color | Status | Definition | Meaning |
|---|---|---|---|---|
| MS | Green | Lit | Device operational | Normal operating status. |
| | Red | Lit | Unrecoverable fault | Unit hardware error (watchdog timer error). |
| | | Flashing | Minor fault | Switch settings incorrect, etc. |
| | --- | Not lit | No power | Power is not being supplied to the Slave Unit.<br>Waiting for initial processing to start.<br>The Unit is being reset. |

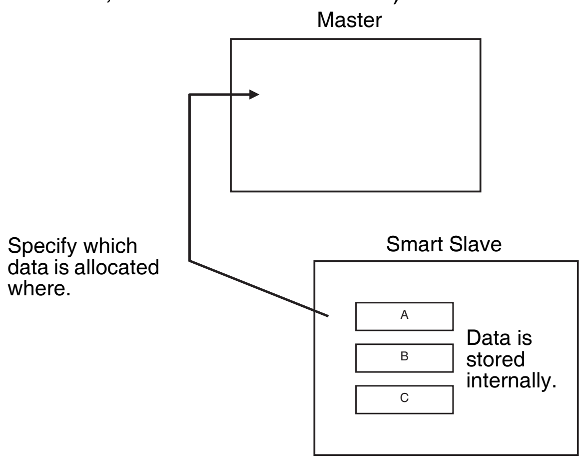
| Indicator | Color | Status | Definition | Meaning |
|---|---|---|---|---|
| NS | Green | Lit | Online/connected | Network is operating normally (communications established). |
| | | Flashing | Online/ not connected | Network is operating normally, but communications have not been established. |
| | Red | Lit | Critical link failure | Communication error below (Unit has detected a condition on the network that prevents communication)<br>• Node address duplication<br>• Bus Off detected |
| | | Flashing | Connection time-out | Communications time-out. |
| | --- | Not lit | Not powered/Not online | Checking for node address duplication at the Master.<br>Switch settings are incorrect.<br>Power supply is OFF. |

# 3-2 DeviceNet Remote I/O Communications

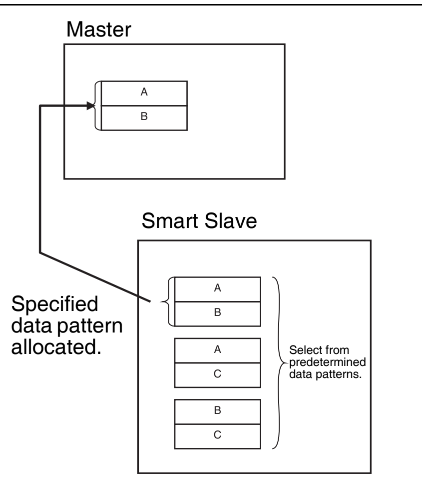
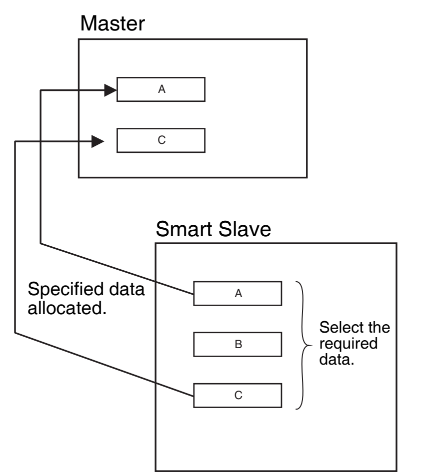
This section describes how DRT2-slave data can be allocated for remote I/O communications with the Master Unit.

## 3-2-1 Overview of Remote I/O Allocations for Smart Slaves

Unlike the DRT1-series Slaves, the DRT2-series Smart Slaves store data internally. When necessary, the user can specify which data is allocated for remote I/O communications with the Master Unit. (Allocation is not required, however, for the default I/O data.)



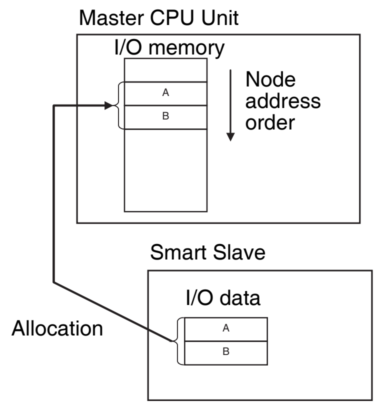
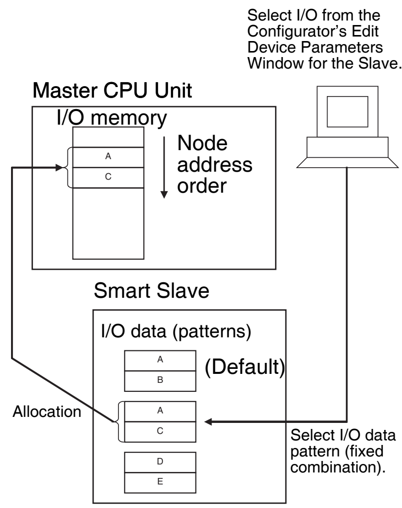

- Data can be specified in either of the two ways described below.

| • Select a data pattern (fixed combination) using the Slave's default connection path setting. | • Select individual data as desired using the Master's connection setting. |
|---|---|
|  |  |
| Either fixed allocation or user allocation is possible. | Only possible with user allocation and if the Master Unit is a CS/CJ-series DeviceNet Unit. |

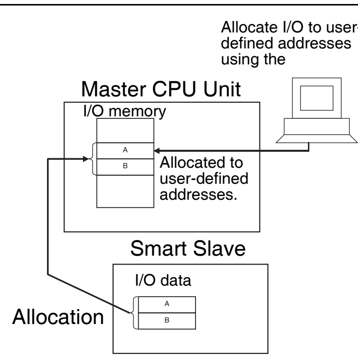
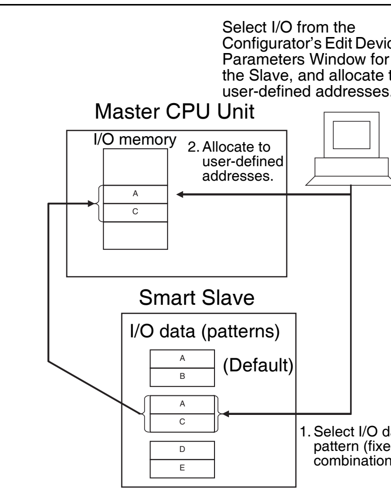
### Smart Slave I/O Allocation Methods

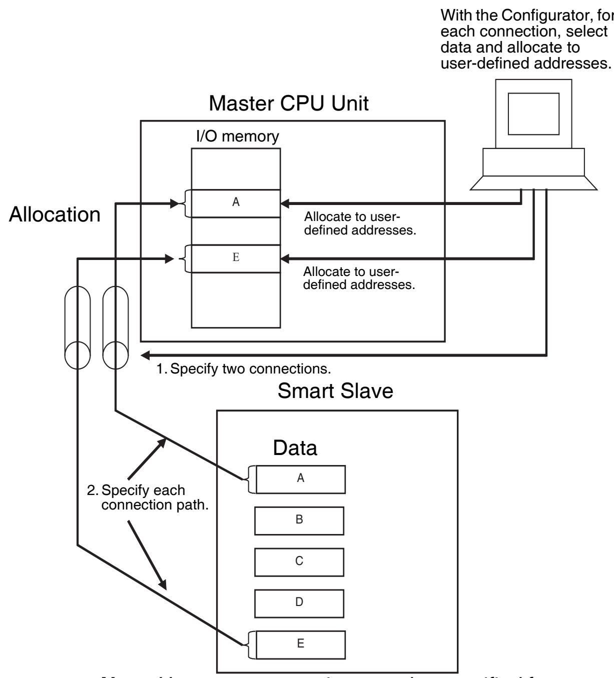
Smart Slave data can be allocated to the Master Unit for remote I/O communications in any of the ways described below.

### Fixed Allocation

| Type | Allocating default I/O data | Allocating selected I/O data (patterns) |
|---|---|---|
| **Description** | I/O data is allocated to fixed addresses in the Master Unit in order of node address. | Selected I/O data (pattern) is allocated to fixed addresses in the Master Unit. |
| **Method** | Configurator not used. | Configurator used to select I/O data (pattern). |
| **Configuration** |  |  |
| **Setting method with Configurator** | None | In the Slave's Edit Device Parameters Window, select the data in the Slave from the pull-down menu for the Slave's default connection path, and execute download. |

### User Allocation

| Type | Allocating default I/O data | Allocating selected I/O data (patterns) |
|---|---|---|
| **Description** | I/O data is allocated to user-defined addresses in the Master Unit. | Selected I/O data (pattern) is allocated to user-defined addresses in the Master Unit. |
| **Method** | Configurator used to allocate user-defined addresses. | 1. Configurator used to select I/O data (pattern).<br>2. Selected data allocated to user-defined memory addresses. |
| **Configuration** |  |  |
| **Setting method with Configurator** | In the Master's Edit Device Parameters Window, allocate Slave I/O. | 1. In the Slave's Edit Device Parameters Window, select the data in the Slave from pull-down menu for the Slave's default connection path, and execute download.<br>2. In the Master's Edit Device Parameters Window, allocate Slave I/O. |

| Type | Selecting I/O data and allocating to user-defined addresses |
|---|---|
| **Description** | Select up to two types of I/O data, and allocate to user-defined addresses in the Master Unit. |
| **Method** | 1. Select up to two types of I/O data using the Configurator.<br>2. Allocate the selected I/O data to user-defined addresses in the Master Unit. |
| **Configuration** | <br>**Note:** Up to two connections can be specified from CS/CJ-series Master Units. |
| **Setting method with Configurator** | 1. In the Master's Edit Device Parameters Window, select the Smart Slave to be set, and specify the connection in the Advanced Setting Window. Select the I/O data (pattern) in the connection path setting.<br>2. In the Master's Edit Device Parameters Window, allocate Slave I/O. |

**Note** The above method can be used only if the Master Unit is a CS/CJ-series DeviceNet Unit. When using a CVM1/CV-series DeviceNet Master Unit, a C200HX/HG/HE/HS DeviceNet Master Unit, or another company's Master Unit, select the I/O data from the pull-down menu for the default connection path in the Slave's Edit Device Parameters Window.

## 3-2-2 I/O Allocations for Smart Slaves

### General-purpose Slaves and Environment-resistive Slaves

DRT2-slave data can be allocated for remote I/O communications with the Master Unit using any of the following methods.

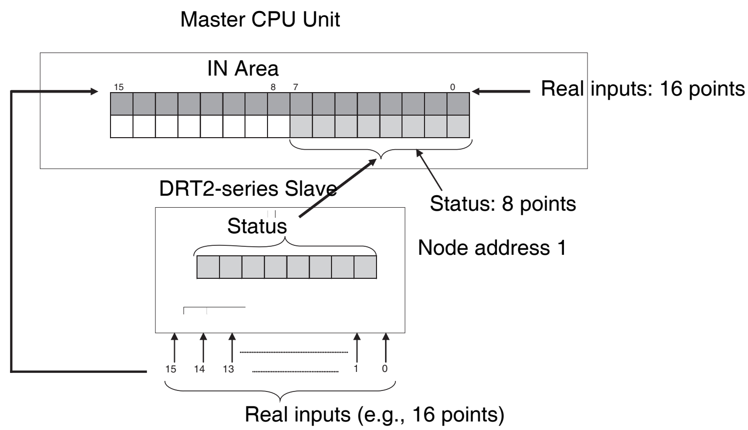
***1,2,3...***

1. Allocating only real I/O data (default)
2. Allocating real I/O data and Generic Status Flags together
3. Allocating real I/O data and Generic Status Flags independently

   Method 2 can be performed by selecting the I/O data and flags from the pull-down menu for the Slave's default connection path using the Configurator.

   Method 3 can be performed by allocating real I/O data and Generic Status Flags independently in the Master's connection path using the Configurator. (This method can be used only with CS/CJ-series Master Units.)

### ■ Example of Allocation Using Method 2




The Generic Status Flags are as follows:

| Bit | Contents | |
|---|---|---|
| 0 | Basic Unit's I/O Power Status Flag<br>0: I/O power supply ON<br>1: I/O power supply OFF | See note 1. |
| 1 | Expansion Unit's I/O Power Status Flag<br>0: I/O power supply ON<br>1: I/O power supply OFF | |
| 2 | Network Power Voltage Drops Flag<br>0: Normal (Higher than set monitor value)<br>1: Error (Same as or lower than set monitor value) | |
| 3 | Unit Maintenance Flag<br>0: Within range (Lower than set monitor value)<br>1: Out of range (Same as or higher than set monitor value) | |
| 4 | Sensor Disconnected Flag (Screw-less Clamp Input and I/O Terminals, and Environment-resistive Input Terminals only) or External Load Disconnected Flag (Screw-less Clamp Output and I/O Terminals only)<br>0: Connected (all inputs connected)<br>1: Disconnected (at least one input is not connected)<br>Cumulative Counter Flag (Analog Input Terminals and Temperature Input Terminals)<br>0: Normal<br>1: Error (monitoring set value exceeded) | |
| 5 | Short-circuited Flag (Sensor Connector Terminals, Screw-less Clamp Input and I/O Terminals, and Environment-resistive Input Terminals only), or External Load Short-circuited Flag (Environment-resistive Output Terminals, Sensor Connector Terminals, I/O Units only)<br>0: Normal I/O (all I/O points normal)<br>1: Short-circuited I/O (one or more I/O point short-circuited)<br>Unit Error Flag (Analog Input Terminals and Temperature Input Terminals)<br>0: Normal<br>1: Error (Data conversion stopped during to error in Unit.) | |

| Bit | Contents | |
|---|---|---|
| 6 | Operation Time Over Flag<br>0: Within range (all output-to-input sets are lower than set monitor value)<br>1: Out of range (one or more output-to-input set is same as or higher than set monitor value) | See note 2. |
| 7 | Connected Component Maintenance Flag<br>0: Within range (all I/O points are lower than set monitor value)<br>1: Out of range (one or more I/O point is same as or higher than set monitor value)<br>Cold Junction Compensator Off-wire Flag<br>0: Normal<br>1: Error (off-wire connected) | |

**Note** 1. Bits 00 and 01 (I/O power supply voltage statuses 1 and 2, respectively) indicate the status of the system power supply, as follows:

| Bit | Name | System configuration | | | |
|---|---|---|---|---|---|
| | | Basic Unit only (Expansion Unit not used) | Basic Unit Input Terminal and Expansion Unit Input Terminal | Basic Unit Output or Input Terminal and Expansion Unit Output Terminal | Basic Unit Output Terminal and Expansion Unit Input Terminal |
| 0 | Basic Unit's I/O Power Status Flag | Basic Unit I/O power supply | | Basic Unit I/O power supply | Basic Unit output power supply |
| 1 | Expansion Unit's I/O Power Status Flag | --- (Not used.) | | Expansion Unit output power supply | Expansion Unit input power supply |

2. The Operation Time Over Flag functions only for Slaves with both inputs and outputs. It does not function for Slaves with only IN or OUT areas.

### Allocating Only Real I/O Data (Default)

**Example 1: Using 16 inputs.**

**IN Area**

| | 15 0 |
|---|---|
| Address header | Allocated 16 inputs. |

**Example 2: Using 16 outputs.**

**OUT Area**

| | 15 0 |
|---|---|
| Address header | Allocated 16 outputs. |

**Example 3: Using 32 inputs.**

**IN Area**

| | 15 0 |
|---|---|
| Address header | Allocated 32 inputs. |
| Address header + 1 | |

**Example 4: Using 16 inputs and 8 inputs (Expansion Unit).**

**IN Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 inputs. | |
| Address header + 1 | | Allocated 8 inputs. |

**Example 5: Using 16 outputs and 8 inputs (Expansion Unit).**

**OUT Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 outputs. | |

**IN Area**

| | 7 | 0 |
|---|---|---|
| Address header | Allocated 8 inputs. | |

### Allocating Real I/O Data and Generic Status Flags Together

The Generic Status Flags are for providing notification of the status of the Smart Slave to the host. They are allocated to the Master Unit's IN Area and consist of 8 bits.

**Example 1: Using 16 inputs.**

**IN Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 inputs. | |
| Address header + 1 | | Generic Status Flags |

**Example 2: Using 16 outputs.**

**OUT Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 outputs. | |

**IN Area**

| | 7 | 0 |
|---|---|---|
| Address header | Generic Status Flags | |

**Example 3: Using 32 inputs.**

**IN Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 32 inputs. | |
| Address header + 1 | | |
| Address header + 2 | | Generic Status Flags |

**Example 4: Using 16 inputs and 8 inputs (Expansion Unit).**

**IN Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 inputs. | |
| Address header + 1 | Generic Status Flags | Allocated 8 inputs. |

**Example 5: Using 16 outputs and 8 inputs (Expansion Unit).**

**OUT Area**

| | 15 | 0 |
|---|---|---|
| Address header | Allocated 16 outputs. | |

**IN Area**

| | 15 — 8 | 7 — 0 |
|---|---|---|
| Address header | Generic Status Flags | Allocated 8 inputs. |

**Allocating Real I/O Data and Generic Status Flags Individually**

Instead of allocating real I/O and Generic Status Flags together, they can be allocated individually. This is only possible, however, if the Master Unit is a CS/CJ-series DeviceNet Unit and the Configurator is used.

| 15 — 0 | |
|---|---|
| I/O Area | Node address 00 |
| I/O Area | Node address 01 |
| : | |
| Status Area | Node address 00 |
| Status Area | Node address 01 |

## Analog Slaves

Data that is allocated for remote I/O communications can be selected using any of the following methods.

*1,2,3...*

1. Allocating only analog values (default I/O data)
2. Allocating a fixed I/O data pattern
3. Allocating user-defined I/O data

With methods 2 and 3, the Configurator is used to specify the I/O data that is to be allocated. An outline of the methods used is given below.

**Allocating Fixed I/O Data Patterns**

There are eleven fixed I/O data patterns. The Configurator is used to select the desired I/O data pattern from the pull-down menu for the Slave's default connection path in the Edit Device Parameters Window.

**Allocating User-defined I/O Data**

Using the Configurator, the desired combination of I/O data can be allocated for the Master Unit connection. The desired connection is selected from the Master's Edit Device Parameters Window. Up to two of the eleven I/O data patterns can be selected for the connection paths of the connection.

**Note** If analog data is allocated to a COS connection, a frame will be sent to the host each analog conversion cycle. This will cause frames to be sent frequently, increasing network traffic and possibly affecting the communications cycle time.

The Generic Status Flags that are allocated are listed in the following tables.

**Analog Terminals**

| Bit | Name | Description |
|---|---|---|
| 0 | --- | Not supported (always 0). |
| 1 | --- | Not supported (always 0). |
| 2 | Network Voltage Monitor Flag | ON as long as the network power supply remains below the monitoring set value. |
| 3 | Unit Conduction Time Monitor Flag | Turns ON when the time that power is supplied to the Unit exceeds the monitoring set value. |
| 4 | Cumulative Counter Flag | Turns ON when any of the cumulative values exceeds the monitoring set value. |
| 5 | Unit Error Flag | Turns ON when analog conversion stops due to an error in the Unit. |
| 6 | --- | Not supported (always 0). |
| 7 | --- | Not supported (always 0). |

**Temperature Input Terminals**

| Bit | Name | Description |
|---|---|---|
| 0 | --- | Not supported (always 0). |
| 1 | --- | Not supported (always 0). |
| 2 | Network Voltage Monitor Flag | ON as long as the network power supply remains below the monitoring set value. |
| 3 | Unit Conduction Time Monitor Flag | Turns ON when the time that power is supplied to the Unit exceeds the monitoring set value. |
| 4 | Temperature Data Cumulative Counter Flag | Turns ON when any of the cumulative values exceeds the monitoring set value. |
| 5 | Unit Error Flag | Turns ON when temperature conversion stops due to an error in the Unit. |
| 6 | --- | Not supported (always 0). |
| 7 | Cold Junction Compensator Off-wire Flag | Turns ON when the cold junction compensator is disconnected. (DRT2-TS04T only) |

The data (patterns) listed in the following tables can be allocated. Ether the default setting can be used or allocations can be made in the master using the Configurator

## ■ I/O Data for Analog Input Terminals (DRT2-AD04/AD04H)

| Data (patterns) |
|---|
| Analog Data 1 (8 input bytes) (default) |
| Analog Data 2 (8 input bytes) |
| Generic Status Flags (1 input byte) |
| Top/Valley Detection Timing Flags (2 input bytes) |
| Analog Status Flags (4 input bytes) |
| Analog Data 1 + Analog Data 2 (16 input bytes) |
| Top/Valley Detection Timing Flags + Generic Status Flags (3 input bytes) |
| Analog Status Flags + Generic Status Flags (5 input bytes) |
| Analog Data 1 + Top/Valley Detection Timing Flags (10 input bytes) |
| Analog Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags (11 input bytes) |
| Hold Flags (1 output byte) |

## ■ I/O Data for Temperature Input Terminals (DRT2-TS4T/TS4P)

| Data (patterns) |
|---|
| Temperature Data 1 (8 input bytes) (default) |
| Temperature Data 1, 1/100 Display (16 input bytes) |
| Temperature Data 2 (8 input bytes) (default) |
| Temperature Data 2, 1/100 Display (16 input bytes) |
| Generic Status Flags (1 input byte) |
| Top/Valley Detection Timing Flags (2 input bytes) |
| Analog Status Flags (4 input bytes) |
| Temperature Data 1 + Temperature Data 2 (16 input bytes) |
| Temperature Data 1 + Temperature Data 2, 1/100 Display (32 input bytes) |
| Top/Valley Detection Timing Flags + Generic Status Flags (3 input bytes) |
| Analog Status Flags + Generic Status Flags (5 input bytes) |
| Temperature Data 1 + Top/Valley Detection Timing Flags (10 input bytes) |
| Temperature Data 1, 1/100 Display + Top/Valley Detection Timing Flags (18 input bytes) |

| Data (patterns) |
|---|
| Temperature Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags (11 input bytes) |
| Temperature Data 1, 1/100 Display + Top/Valley Detection Timing Flags + Generic Status Flags (19 input bytes) |
| Hold Flags (1 output byte) |

## 3-2-3 I/O Allocation with the Configurator (Ver. 2.□ or Later)

### Allocating Selected I/O Data (Patterns)

In the Slave's Edit Device Parameters Window, select the required data from the pull-down list (default connection path setting) and execute download.

When performing user-defined allocation, in addition to the above, allocate Slave I/O in the Master's Edit Device Parameters Window.

**Note** Perform I/O allocation using this method if the Master Unit is a CVM1/CV-series DeviceNet Master Unit, a C200HX/HG/HE/HS DeviceNet Master Unit, or another company's Master Unit.

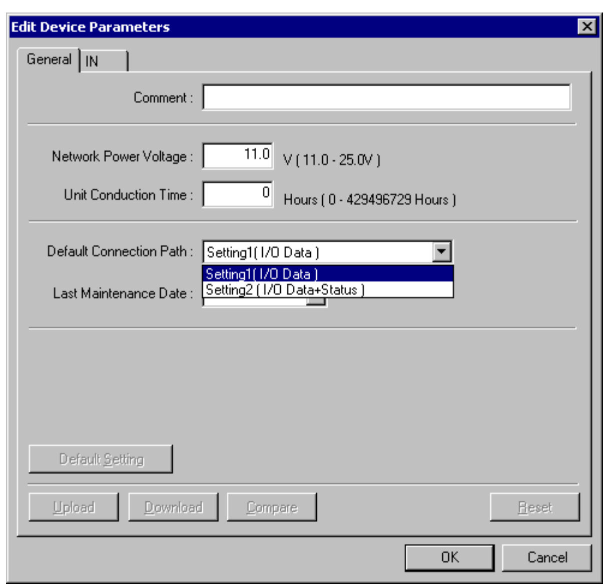
The setting example below is for allocating I/O data and Generic Status Flags for a General-purpose Slave. For details on the setting method for Analog Slaves, refer to *7-4-2 I/O Data Allocation Methods*.

**Procedure**

Using the Configurator, set the default connection path in the Slave's Edit Device Parameters Window. Turn ON the power for the PLC connected to the Smart Slave and change the mode of the PLC to PROGRAM mode.

***1,2,3...***

1. Turn ON the power for the DRT2-series Smart Slave.
2. Click the right mouse button over the icon of the corresponding DRT2-series Smart Slave in the Network Configuration Window, and select ***Parameters*** and ***Edit*** to display the Edit Device Parameters Window.
3. Click the **General** Tab and select the desired setting from the pull-down menu under the *Default Connection Path* field.




4. Click the **Download** Button and then click the **Reset** Button.
5. Click the **OK** Button.

Default Connection Path (General-purpose Slave)

| Selection | IN/OUT | Input Unit | Output Unit | I/O Unit |
|---|---|---|---|---|
| Setting 1 (I/O Data) (default setting) | IN data | Real input data | None | Real input data |
| | OUT data | None | Real output data | Real output data |
| Setting 2 (I/O Data+Status) | IN data | Real I/O data + status information | Status information | Real input data + status information |
| | OUT data | None | Real output data | Real output data |

## Allocating User-defined Data

This method is possible only with a CS/CJ-series DeviceNet Unit and user-defined allocations.

In the Master's Edit Device Parameters Window, select the Smart Slave to be set, and specify the connection in the Advanced Setting Window. Select the I/O data (pattern) in the connection path setting.

In the Master's Edit Device Parameters Window, allocate Slave I/O.

**Note**

1. For details on connections and connection paths, refer to *Appendix B DeviceNet Connections* in the *DeviceNet Units Operation Manual* (W380).
2. Master Unit settings take precedence and so it is not necessary to set the Slave's default connection path.

The setting example below is for allocating 16 inputs, 8 outputs, and Generic Status Flags for a General-purpose Slave. For details on the setting method for Analog Slaves, refer to *7-4-2 I/O Data Allocation Methods*.

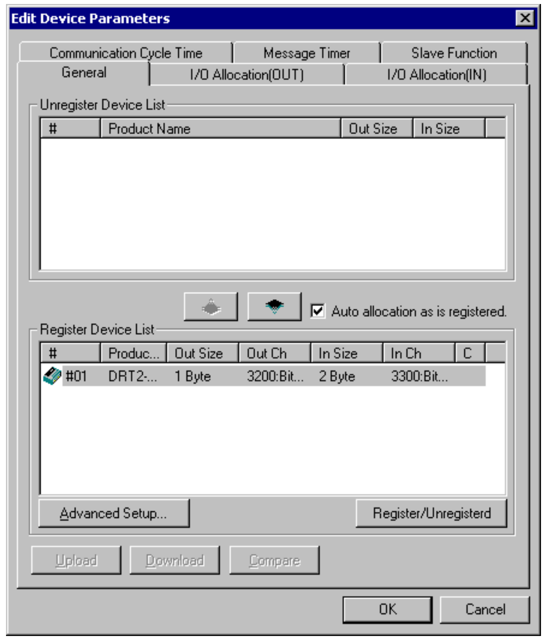
**Example: Using 16 inputs, 8 outputs, and status information.**

| Address | 15 | 0 |
|---|---|---|
| CIO 3200 | | 8 outputs |
| | : | |
| CIO 3300 | 16 inputs | |
| | : | |
| CIO 3500 | | Generic Status Flags |

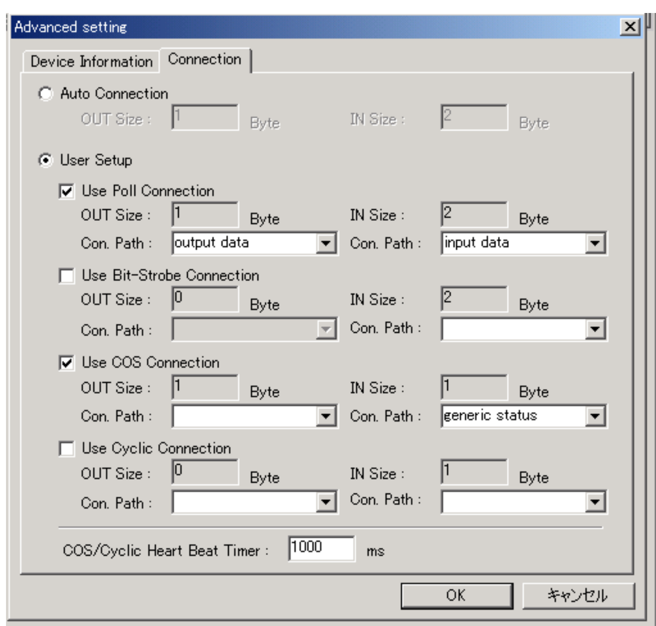
### Procedure

***1,2,3...***

1. In the Network Configuration Window, select the Master Unit, and double-click or click the right mouse button and select ***Parameter – Edit – General***, and then select the Smart Slave to be set.




2. Click the **Advanced Setup** Button, click the **Connection** Tab, and select ***User Setup***. Select ***Use Poll Connection*** and ***Use COS Connection*** and then select ***output data***, ***input data***, and ***generic status*** for the respective connection paths. In this example, the IN size for COS connection is set to ***generic status***, the IN size for poll connection is set to ***input data***, and OUT size for poll connection is set to ***output data***.



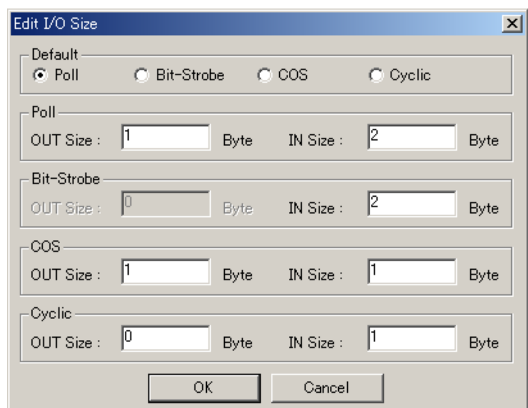

3. Click the **OK** Button.

**Note** If there are checks in the checkboxes but the connection path settings are left blank, the following settings will be made automatically.

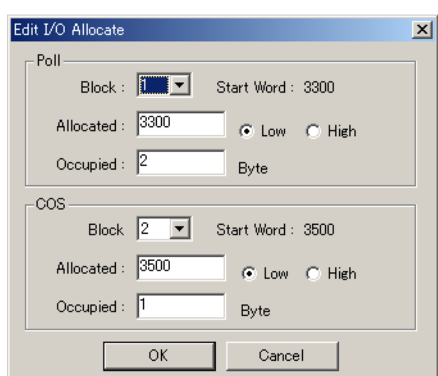
| | IN (Smart Slave to Master Unit) | OUT (Master Unit to Smart Slave) |
|---|---|---|
| Poll | input data | output data |
| Bit-Strobe | input data | Not set. |
| COS | generic status | Not set. |
| Cyclic | generic status | Not set. |

**Note** For Slaves with outputs (and consequently output size settings), if the poll and COS connections are used at the same time, the output size settings for poll and COS connections must be set to the same value. Perform this setting with the Configurator using the method below. (The default output size setting for the COS connection is 0.)

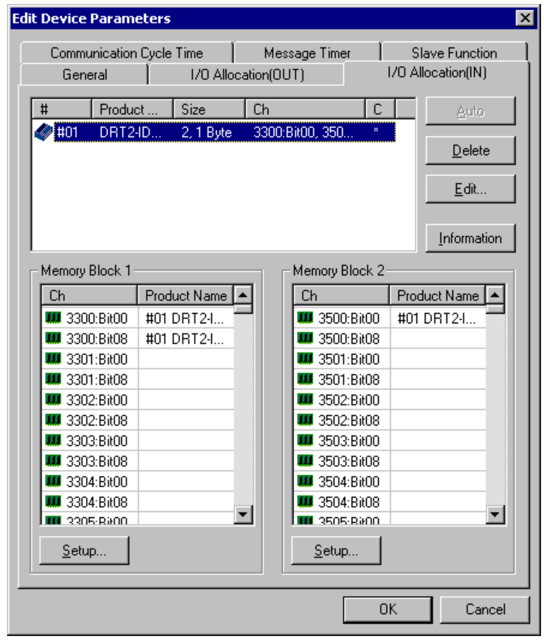
Click the right mouse button over the Slave to be set, select ***Property***, click the **I/O Information** Tab, and then click the **Edit** Button. In the Edit I/O Size Window, set the *OUT Size* for the poll and COS connections to the same value.



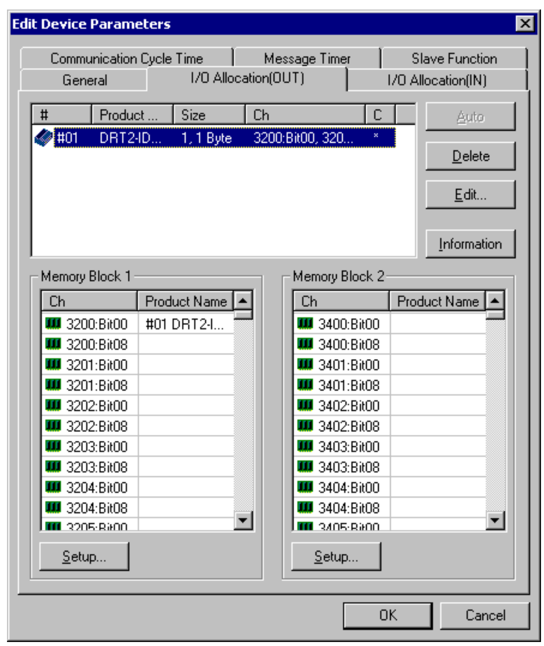

4. Click the **I/O Allocation (IN)** Tab and edit the I/O allocations.
   Select the Smart Slave to be set and click the **Edit** Button to display the Edit I/O Allocate Window.
   Set the *Poll* settings (indicates input data) to block 1, allocated 3300.
   Set the *COS* settings (indicates generic data) to block 2, allocated 3500.



5. Click the **OK** Button.




6. In the same way as above, click the **I/O Allocation (OUT)** Tab and edit the I/O allocations. Set to block 1, allocated 3200.




7. Return to the General Tab Page and click **Download**.

**Note** When *Auto allocation as is registered.* is selected in the General Tab Page, each time the connection path is set, a message will be displayed indicating that the current I/O allocations have been deleted because the connection has been changed. To set the connection path, deselect *Auto allocation as is registered.* before registering the Slaves.

# SECTION 4
# Functions of All Slaves, General-purpose Slaves, and Environment-resistive Slaves

This section describes the functions of DRT2-series Smart Slaves and their applications, including operation procedures using a DeviceNet Configurator.

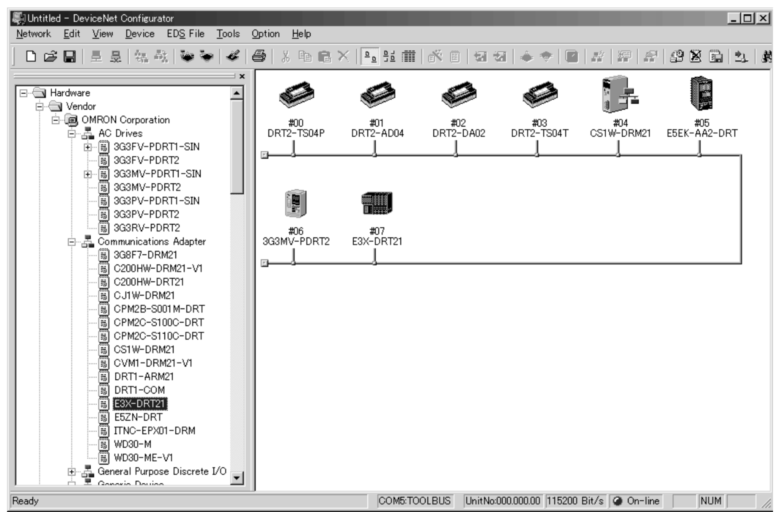
# 4-1 Maintenance Mode Window and Main Window

The OMRON DeviceNet Configurator (Ver. 2.20 or higher) is provided with two Network display windows, consisting of the standard Main Window and a Maintenance Mode Window. The windows can be easily switched by clicking the  icon or selecting maintenance mode under the View Menu.

## 4-1-1 Normal Window

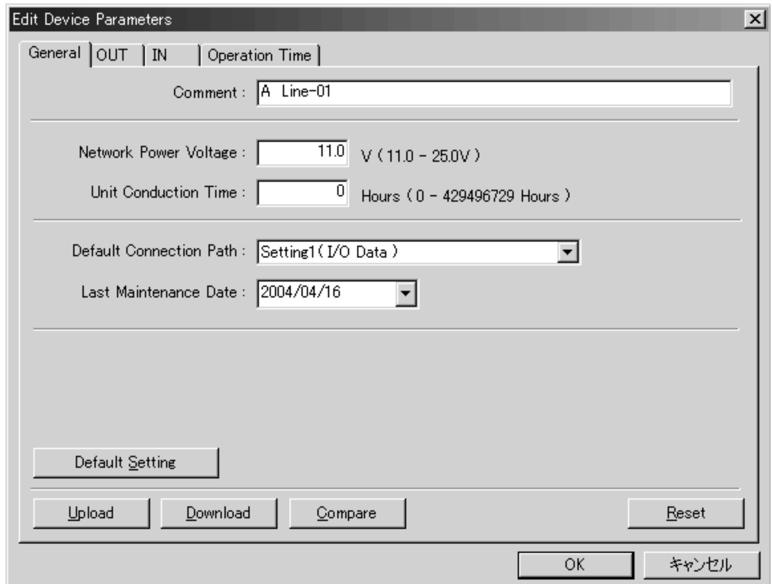
The Normal Window is displayed when the DeviceNet Configurator is started. It has a while background. Normally this window is used to set parameters and other settings. Double-click any Slave in the Normal Window to enable setting and editing device parameters for the Slave. Refer to *4-2 Common Slave Functions* for information on setting and editing Slave functions. Also refer to the setting methods for the functions listed for each Slave.

### Normal Window



**Device Parameter Editing Window**

This window is used to set and edit settings for functions. Double-click any Slave or select the slave, right-click, and select ***Parameter - Edit*** from the popup menu.




## 4-1-2 Maintenance Mode Window

The Maintenance Mode Window is different from the Main Window and is used to easily monitor information on the DRT2-series Smart Slaves. The windows can be easily switched by clicking the icon or selecting maintenance mode under the View Menu. The Maintenance Mode Window is displayed with a pale blue background.

The Maintenance Mode Window displays information on the DRT2-series Smart Slaves in the Maintenance Information Window. Open the Maintenance Mode Window when to access status information on any of the Smart Slaves.

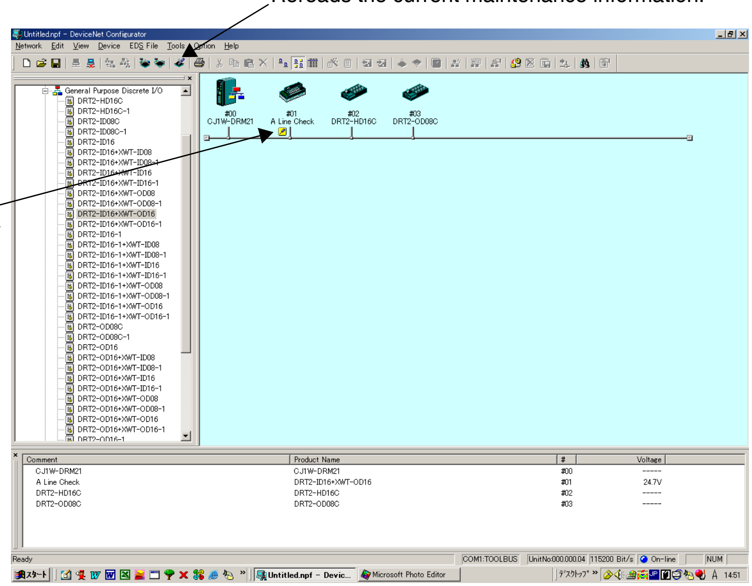
In the Network Configuration Window, when an error is detected in any of the Slaves' settings, a yellow warning icon indicating the error details will be displayed next to the corresponding Slave icon. This function allows the user to know the status of each device, the maintenance period, and the location where an error has been detected.

**Note** The Maintenance Mode Window is not refreshed continuously. The status that is display is read when the network is uploaded. To see the most recent status, click the refresh maintenance information icon to read the current status information, or use the Device Monitor Window to see continuously updated Smart Slave status. (Refer to *4-1-3 Device Monitor Window*.)

## Maintenance Mode Window

Refresh maintenance information icon
Rereads the current maintenance information.

Warning icon
Maintenance Information Window

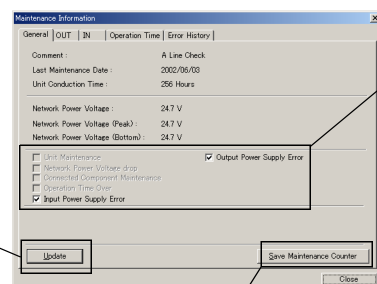


## Maintenance Information Window

Double-click the icon of the DRT2-series Smart Slave that is indicated by the warning icon to display the Maintenance Information Window for the individual Slave. Refer to the section on the Maintenance Information Window for each Slave for details on the information that is displayed.

Maintenance information
Refreshes the maintenance information for the current Slave.

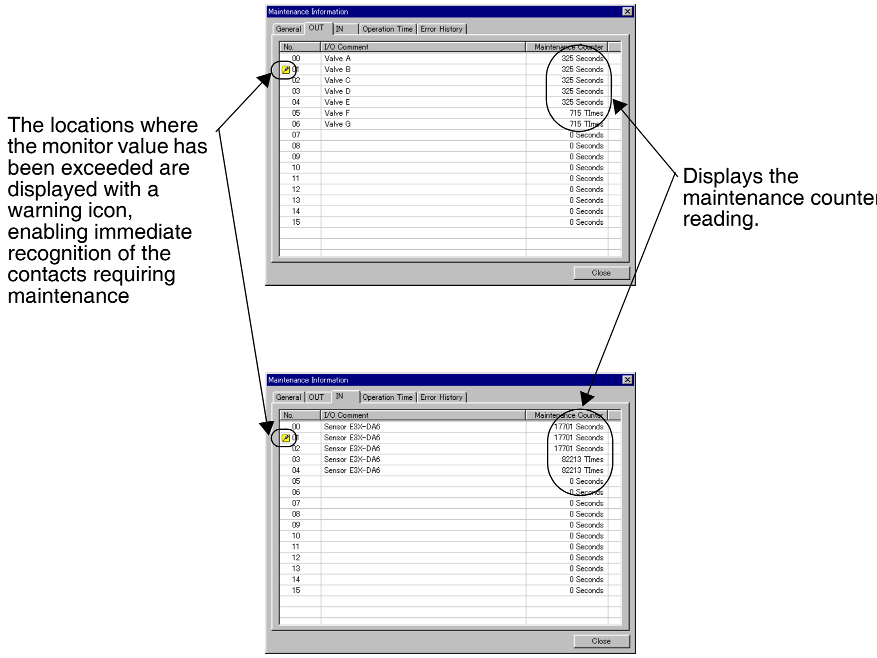
Refreshes the maintenance information for the current Slave.




The Smart Slave's maintenance counter can be saved in flash memory. Normally, the contact operation counter records the value every six minutes, so the number of operations may not be recorded accurately, depending on when the contact's power is turned OFF.

**OUT Tab and IN Tab**

According to the maintenance information, select the **OUT** Tab, **IN** Tab, or **Operation Time** Tab to view more detailed information.

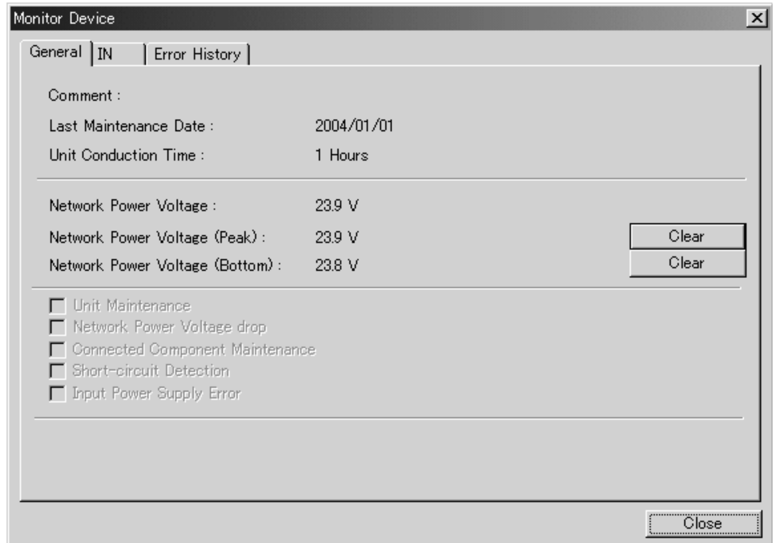



## 4-1-3 Device Monitor Window

The Device Monitor Window enables easy monitoring of information on Smart Slaves. The same information is displayed as for the Maintenance Mode Window, but the displayed information is continuously updated online between the Slave and Configurator by explicit messages. Continuous updating is not performed for the Maintenance Mode Window. Use the Device Monitor Window whenever it is necessary to check the most recent Smart Slave information.

The Device Monitor Window can be displayed when the Configurator is online by right-clicking and selecting ***Monitor*** from the popup menu. Refer to the section on the Maintenance Information Window for each Slave for details on the information that is displayed.

## Device Monitor Window




**Note** Large quantities of data are exchanged between the Slave and Configurator to enable the device monitor function. If a toolbus connection is used for the Configurator, the time required to refresh all of the information depends on the Slave and can be very long. We thus recommend using a DeviceNet Board (PCMCIA, PCI, or ISA) to connect the Configurator whenever using the device monitor function. Refer to *Section 2 Installation* in the *DeviceNet Configurator Operation Manual* (Cat. No. W382) for details.
A toolbus connection is used when a CS1W-DRM21 or CJ1W-DRM21 Master Unit is used and the Configurator is connected via RS-232C.

# 4-2 Common Slave Functions

The functions common to all DRT2-series Slaves and their usage procedures are described here.

## 4-2-1 Automatic Baud Rate Recognition

The Smart Slaves are automatically set to the baud rate of the Master Unit. Therefore, the baud rate does not require being set for each Unit using the DIP switch as with previous models.

After the power is turned ON, as soon as communications are established with the Master Unit, the baud rate is set, and the setting is saved until the next time the power is turned ON.

**Note** When changing the baud rate of the Master Unit, always turn the Slave's Network power supply OFF and ON again.
The Slave's baud rate will be automatically set to the Configurator's baud rate when the Configurator is used to set a Smart Slave when there is no Master. To change the baud rate, turn the Smart Slave's Network power supply OFF and ON again.

## 4-2-2 Network Power Supply Voltage Monitor

### Function Overview

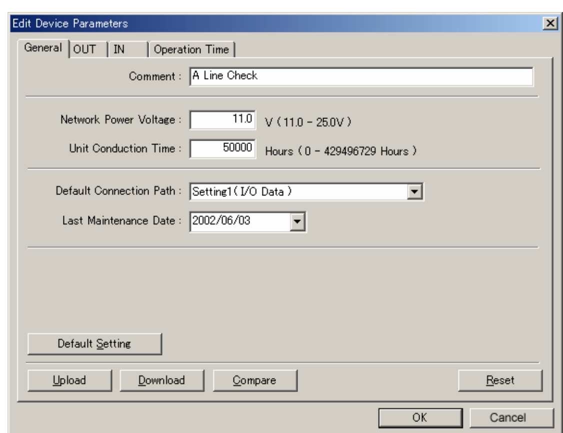
The present, bottom, and peak values of the Network power voltage can be recorded in the Slave. The monitor voltage (factory setting: 11 V) can be maintained in the Slave and the Network Power Voltage Error Flag in the Status Area will be turned ON when the voltage drops below the set monitor value. The current, minimum, and maximum values of the Network power voltage, and the Network Power Voltage Error Flag can be read from the Configurator. The monitor voltage can be set using the Configurator.

**Note**
1. The communications power voltage of the actual DeviceNet is 11 V minimum, so if the communications power voltage drops below 11 V, the operation for reading the measurement values using the Configurator may not function properly.
2. The maximum and minimum Network power voltages are cleared when the Network power is turned OFF.

### Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

*1,2,3...*
1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **General** Tab.




4. Enter the desired value in the *Network Power Voltage* field. (The default value is 11 V.)
5. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

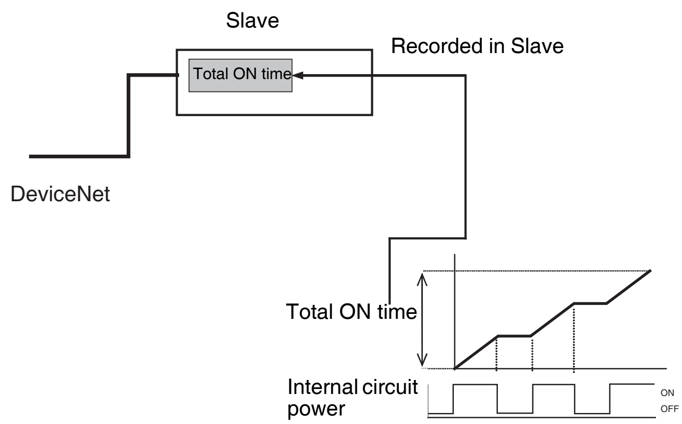
## 4-2-3 Unit Conduction Time Monitor

### Function Overview

The total ON time (unit: 0.1 hrs) of the Slave's internal circuit power can be calculated and recorded. (The Configurator or explicit messages can be used to read the information.)

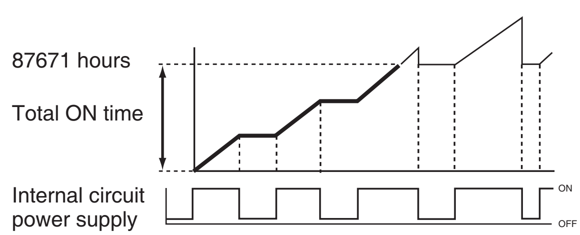
The monitor value can be maintained in the Slave and the Unit Maintenance Flag in the Status Area will be turned ON when the total time reaches the set monitor value. The total ON time can be read using the Configurator or explicit messages.)

- Measured time: 0 to 429496729 hours (stored data: 00000000 to FFFFFFFF Hex)
- Measuring unit: 0.1 hr




**Note**

1. The Unit conduction time monitor calculates the total time that the Smart Slave's Network power supply is ON. The total time is not calculated when the power is OFF.
2. When the power ON time reaches 87672 hours (10 years), saving of the power ON time in non-volatile memory in the unit stops.
3. After the power ON time reaches 87672 hours (10 years), the power On time count continues while the power is ON, but when the power is turned OFF and then ON, the count resumes from 87671.



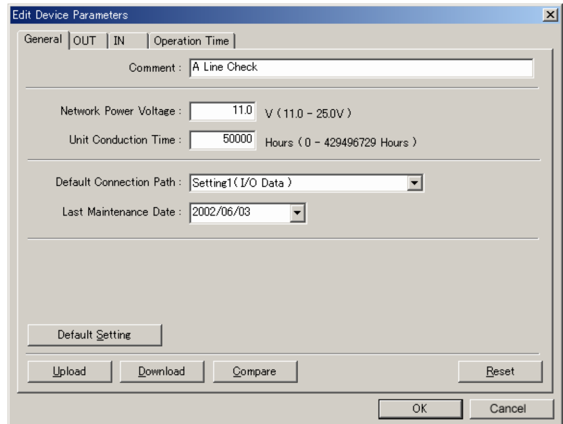

### Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

*1,2,3...*

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

3. Select the **General** Tab.

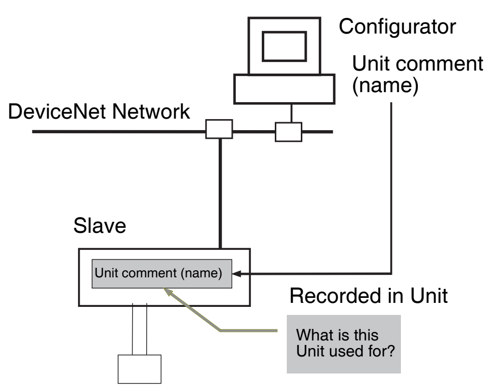



4. Enter the desired value in the *Unit Conduction Time* field.
5. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

## 4-2-4 Slave Comments

### Function Overview

The user can assign and record a name or comment for every Unit (up to 32 characters). The Configurator or explicit messages can be used to read and write these Unit names (comments).




### Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

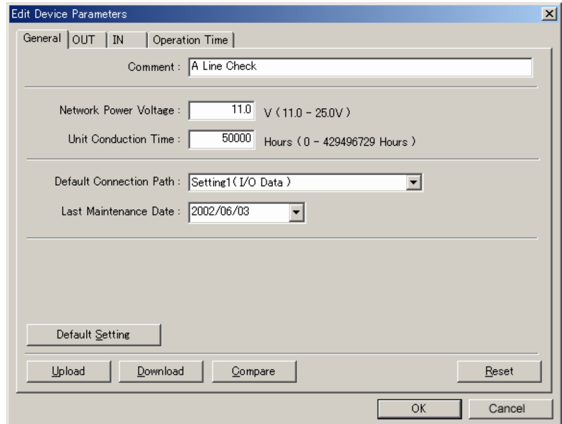
Either of the following two settings methods can be used.

#### Setting Method 1

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

3. Select the **General** Tab.



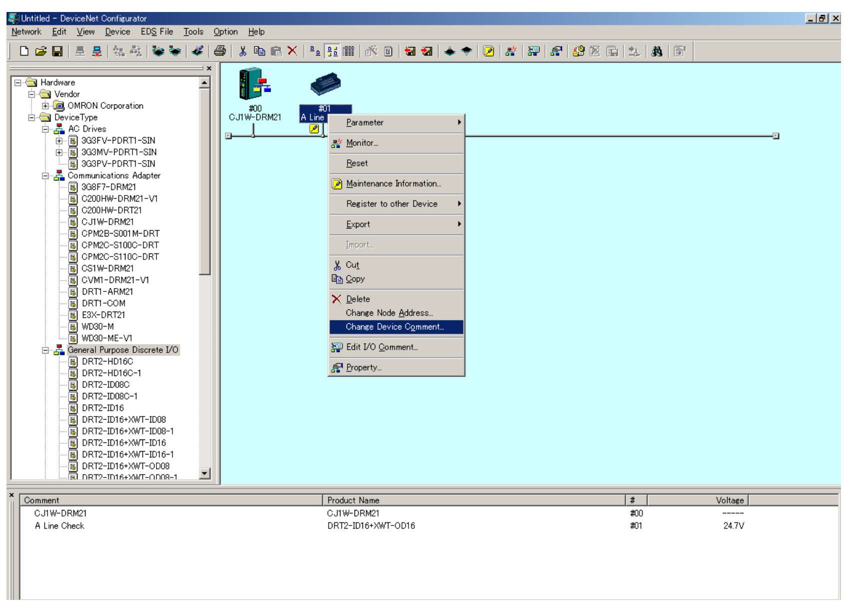

4. Enter the desired name in the *Comment* field.
5. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

**Setting Method 2**

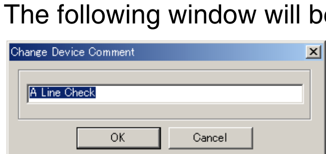
The procedure for this setting method is the same from both the Main Window and the Maintenance Mode Window.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. Click the right mouse button over the icon of the DRT2-series Smart Slave to be set in the Network Configuration Window, and select ***Change Device Comment***.




3. The following window will be displayed. Enter the desired name.

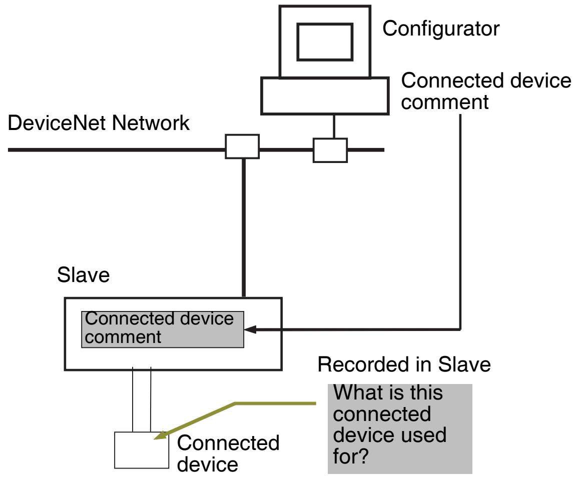



4. Click the **OK** Button.
5. Click the right mouse button over the icon of the DRT2-series Smart Slave to be set, and select ***Parameter*** and ***Download***.

## 4-2-5 I/O Comments

### Function Overview

The user can assign a name for each of the Unit's I/O contacts (up to 32 characters) and record it in the Unit. The connected device can be checked for each I/O contact, allowing faulty devices to be identified during remote maintenance. The Configurator or explicit messages can be used to read and write the names (comments) of the connected devices.



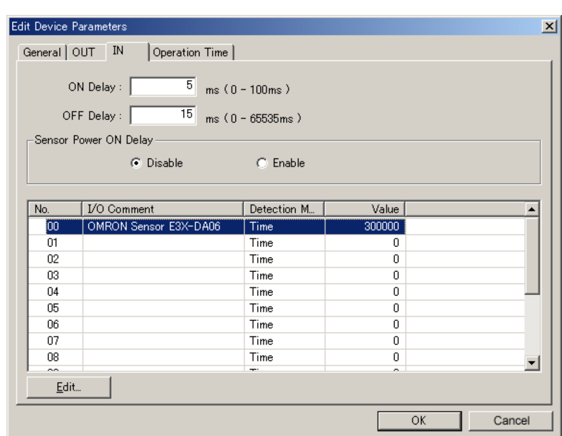

### Setting Using the DeviceNet Configurator

Either of the following two setting methods can be used.

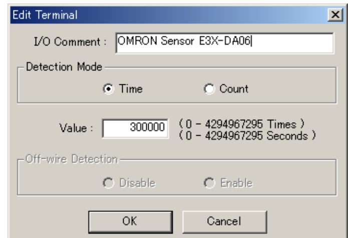
**Setting Method 1**

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **IN** or **OUT** Tab. The following window will be displayed. Enter the desired name.



4. Double-click the ***I/O Comment*** field for the connected device that is to be assigned a name (comment). The following window will be displayed. Enter the desired name and click the **OK** Button.



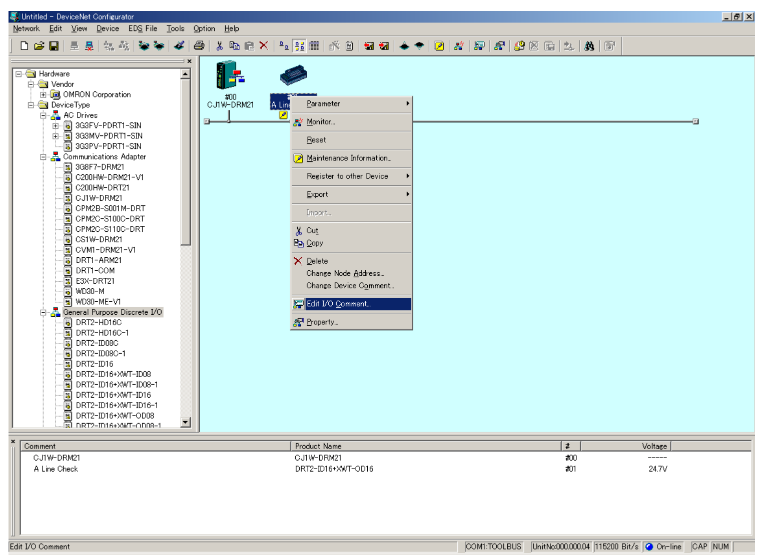

5. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

**Setting Method 2**

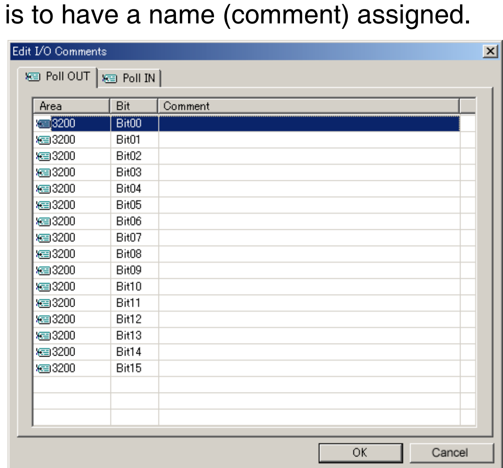
The procedure for this setting method is the same from both the Main Window and the Maintenance Mode Window.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. Double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set in the Network Configuration Window, and select ***Edit I/O Comment***.

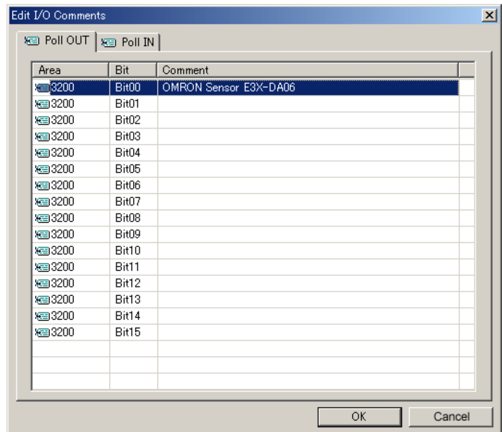



3. The following type of window will be displayed. Select the terminal which is to have a name (comment) assigned.



**Note** With Analog Terminals, comments input using setting method 1 are not automatically reflected in this window. Before saving the comments to an I/O comment file, make the settings using setting method 2.

4. Double-click the ***Comment*** field of the terminal to be set and enter the desired name.



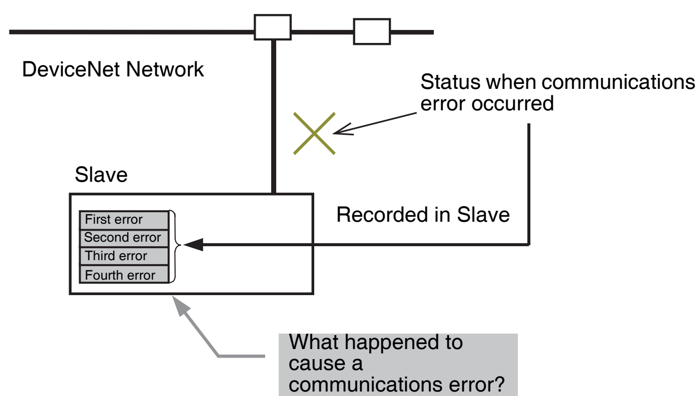

5. Click the **OK** Button.
6. Double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set, and select ***Parameter*** and ***Download***.

## 4-2-6 Communications Error History Monitor

### Function Overview

The error status information (communications error code, communications power voltage when the error occurred) for the last four communications errors that occurred can be recorded in the Slave.

(The Configurator can be used to read the communications error history.)

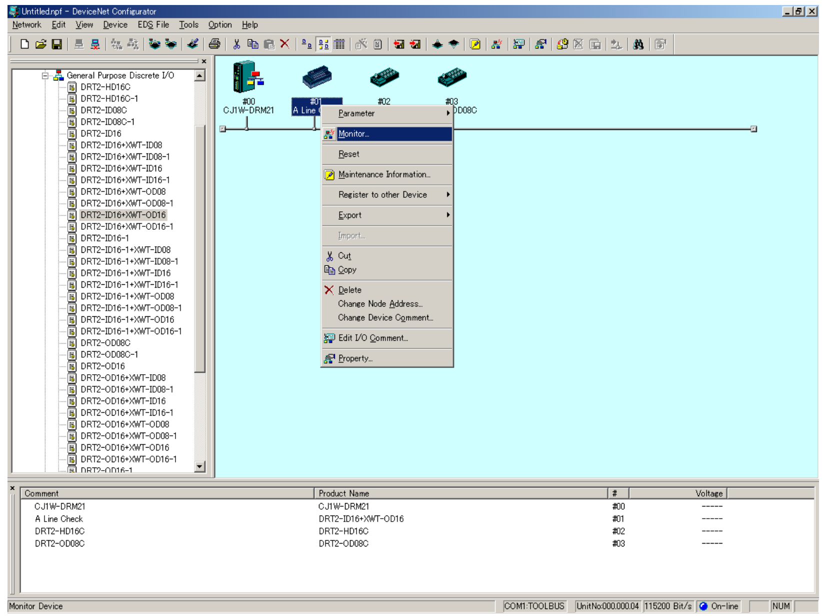


## Checking Using the DeviceNet Configurator

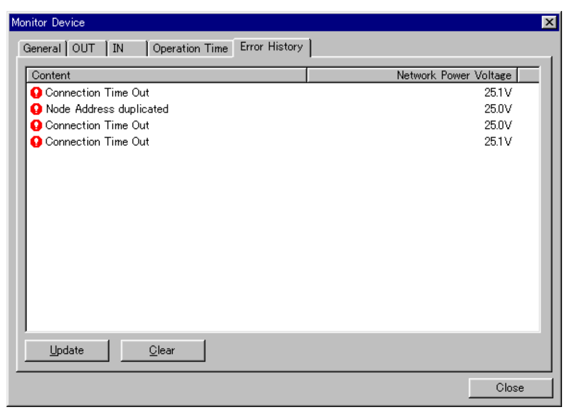
The method used to check error information from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. Click the right mouse button over the icon of the DRT2-series Smart Slave to be set in the Network Configuration Window, and select ***Monitor***.




3. Select the **Error History** Tab in the Monitor Device Window. The communications error history for the last four errors that occurred will be displayed, as shown in the following window. To display the most recent error history, click the **Update** Button.




**Note** From the Maintenance Mode Window, double-click the Slave icon, and select the **Error History** Tab from the Maintenance Information Window.

# 4-2-7 Last Maintenance Date

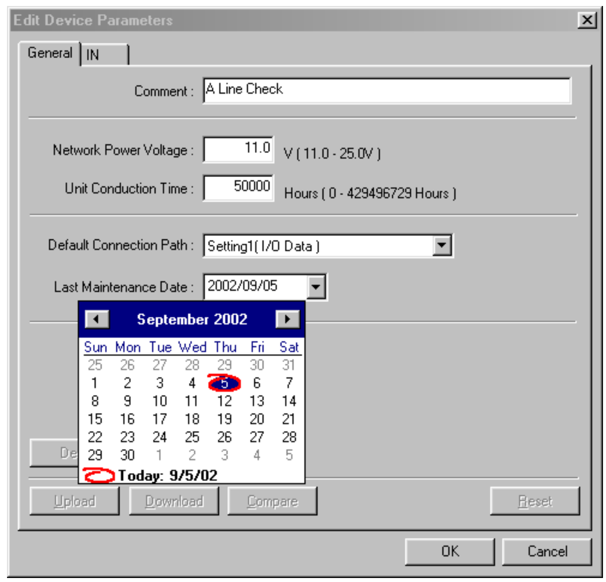
## Function Overview

This function enables the date on which maintenance was last performed to be written to the Unit. This means that the timing for future maintenance can be judged more easily. The date can be written using the Configurator.

## Setting Using the DeviceNet Configurator

***1,2,3...***

1. From the Main Window, double-click the icon of the Smart Slave to be set to display the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the icon of the Smart Slave to be set and select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.)
2. Click the **General** Tab, and select the desired date from the pull-down menu for the *Last Maintenance Date* field. (Click the **Today** Button to enter the current date.)




3. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button.

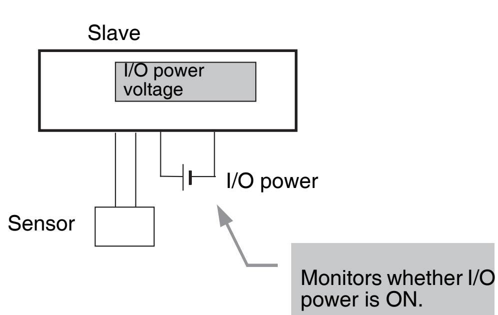
# 4-3 Functions of General-purpose Slaves and Environment-resistive Slaves

## 4-3-1 I/O Power Status Monitor

### Function Overview

This function is used to detect whether the I/O power is ON.

When the I/O power supply is turned OFF, the Basic Unit I/O Power Voltage Status Flag or Expansion Unit I/O Power Status Flag in the Status Area is turned ON. (The Configurator or explicit messages can be used to read the information.)



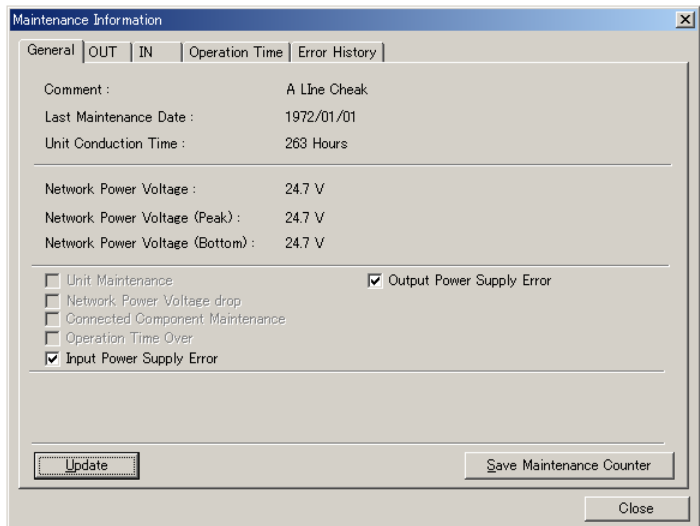
**Note** The value for detecting a low voltage for the I/O power cannot be set.

### Checking Using the DeviceNet Configurator

The method used to check information from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

*1,2,3...*

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Maintenance Mode Window, double-click the icon of the applicable DRT2-series Smart Slave in the Network Configuration Window to display the Maintenance Information Window. The I/O power is not being supplied if the *Input Power Supply Error* or *Output Power Supply Error* items are selected.




## 4-3-2 Input Filter

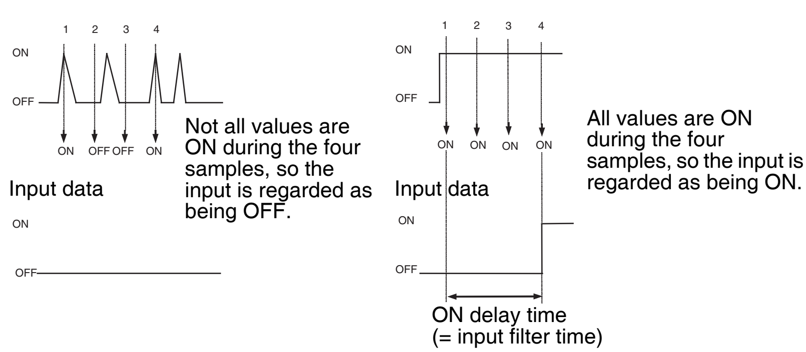
### Function Overview

Input values can be read several times during a set interval so that the input value is enabled only when the value of all samples are the same. The input filter is applied to all of the inputs of the Unit.

**ON Response Time (Variable from 0 to 100 ms)**

When input data changes to ON, the input data is read four times for the period of the set interval (1/4 of 0 to 100 ms). If all values are ON, the input is turned ON. The ON timing is delayed according to the length of the ON response time.

The input filter can also be used to perform an ON delay operation (a delay for the ON response time is created when the input filter is enabled).

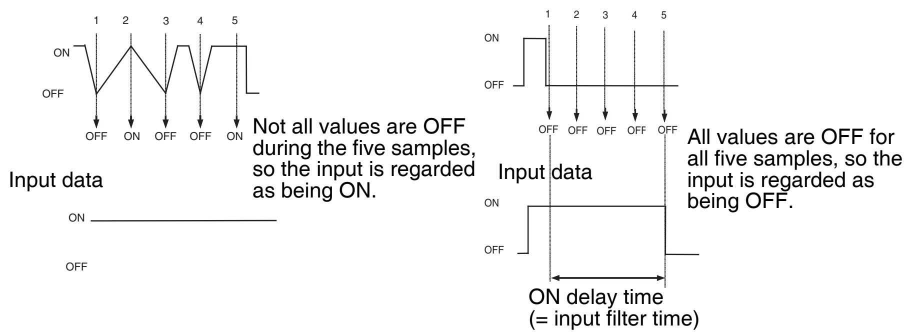


**OFF Response Time (Variable from 0 to 65535 ms)**

When input data changes to OFF, the input data is read five times for the period of the set interval (1/5 of 0 to 65,535 ms). If all values are OFF, the input is turned OFF. The OFF timing is delayed according to the length of the OFF response time.

The input filter can also be used for ON/OFF delay operations.

To use a pulse shorter than the communications cycle time, set the OFF response time to a value longer than the communications cycle time. (If the input pulse is short, the input may remain ON.)

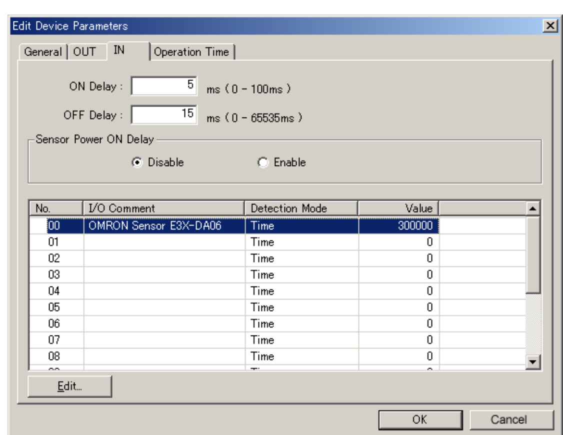



## Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **IN** Tab.
   Enter a value for the ON response time and OFF response time, and then click the **OK** Button.




4. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button.

## 4-3-3 Power ON Delay

### Function Overview

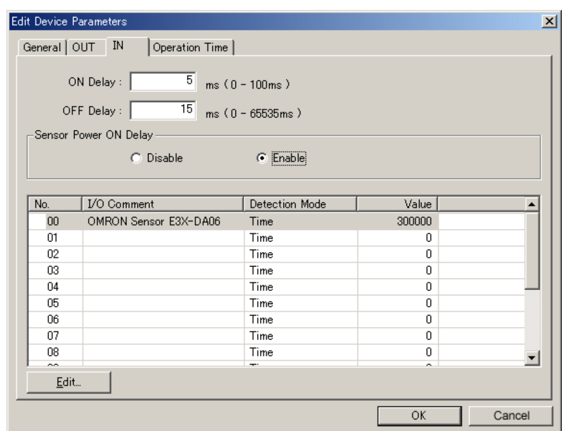
The I/O power is monitored, and input is stopped when the I/O power is OFF and for 100 ms after the I/O power is turned ON (i.e., until the power supply becomes stable). This function prevents incorrect input caused by inrush current at startup from connected devices when the I/O power is turned ON. The Configurator or explicit messages can be used to enable or disable this function.

### Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **IN** Tab.
   Select *Enable* under the item for preventing malfunctions caused by inrush current at startup and click the **OK** Button.




4. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button.

## 4-3-4 Contact Operation Counter

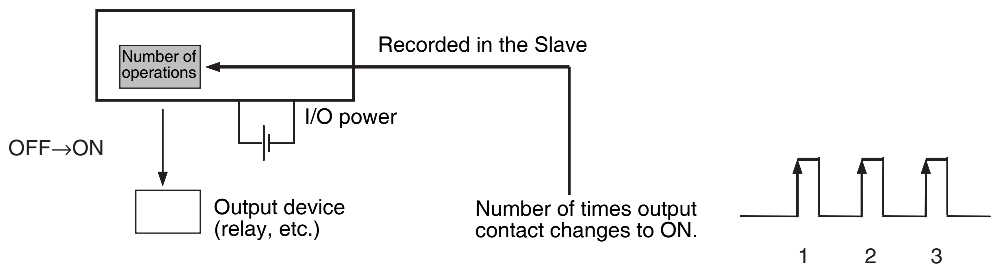
### Function Overview

The Contact Operation Counter is used to count the number of times each input or output contact is changed from OFF to ON (maximum resolution 50 Hz) and record the total value calculated in the Slave. (The Configurator or explicit messages can be used to read the information.)

The monitor value can be set in the Slave, and when the set number of operations is reached, the Connected Component Maintenance Flag in the Status Area will be turned ON. (The Configurator or explicit messages can be used to read the status of the Connected Device Maintenance Flag.)

- Counted operations: 0 to 4294967295 operations (stored data: 00000000 to FFFFFFFF Hex)

- Counting unit: One operation




**Note** 1. The Contact Operation Counter and Total ON Time Monitor cannot be used at the same time for a single contact. Select the function to be used under the *Detection Mode* heading.

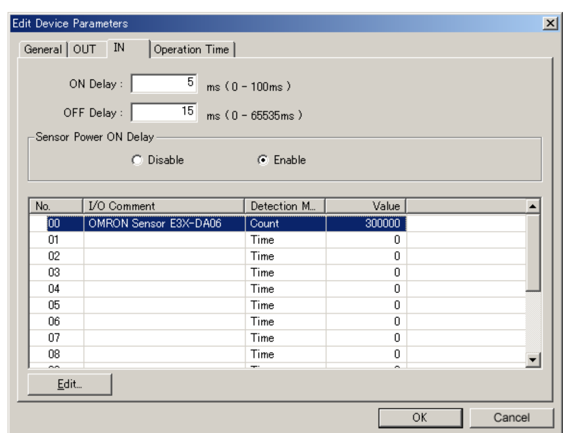
2. The Contact Operation Counter will operate when the I/O power is ON only.

## Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

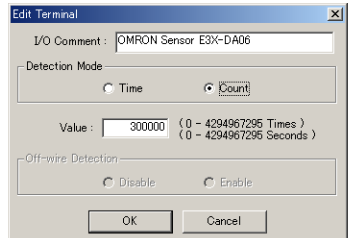
***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **IN** Tab.




4. Double-click the ***I/O Comment*** field of the applicable contact to display the following window. Select *Count* under *Detection Mode*, enter a value in the

*Value* field, and then click the **OK** Button.




5. After checking that the setting for the monitor value is reflected in the Edit Device Parameters Window, select the **General** Tab and click the **Download** Button.
6. Click the **OK** Button.

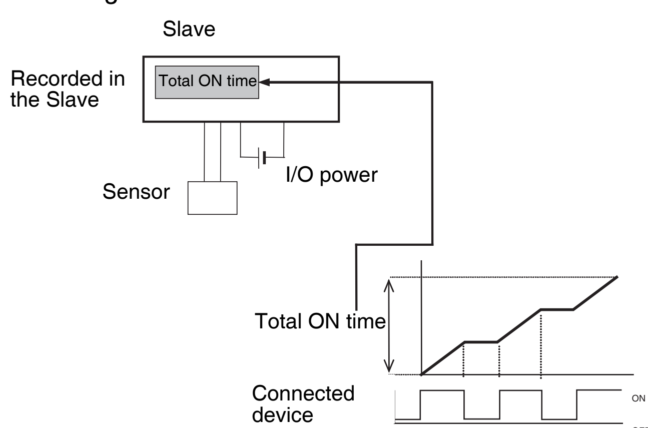
## 4-3-5 Total ON Time Monitor

### Function Overview

The total ON time for each I/O contact can be calculated (unit: s) and recorded in the Slave. (The Configurator or explicit messages can be used to read the information.)

The monitor value can be set in the Slave, and when the set number of operations is reached, the Connected Component Maintenance Flag in the Status Area is turned ON. (The Configurator or explicit messages can be used to read the status of the Connected Component Maintenance Flag.)

- Measured time: 0 to 4294967295 s (stored data: 00000000 to FFFFFFFF Hex)
- Measuring unit: s




**Note**

1. The Total ON Time Monitor and Contact Operation Counter cannot be used at the same time for a single contact. Select the function to be used under the *Detection Mode* heading.
2. The Total ON Time Monitor operates when the I/O power is ON only.
3. The Total ON Time Monitor checks approximately every second whether the connected devices are ON.
   If the total ON time is calculated for ON times of less than a second, the measurement may not be accurate.

■ **Measurement for ON time of 0.5 s:**

In Fig. 1, the actual ON time is 0.5 s × 3 = 1.5 s. The measurement will be taken once during this ON time, so the total ON time will be measured as 1 s.

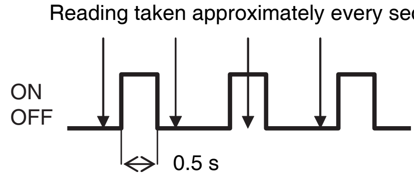



**Figure 1**

In Fig. 2, the actual ON time is 0.5 s × 3 = 1.5 s. The reading will be taken twice during this ON time, so the total ON time will be measured as 2 s.

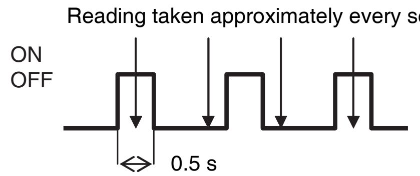



**Figure 2**

■ **Measurement for ON time of 1.5 s:**

In Fig. 3, the actual ON time is 1.5 s × 2 = 3 s. The measurement will be taken four times during this ON time, so the total ON time will be measured as 4 s.

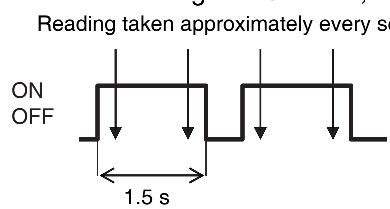



**Figure 3**

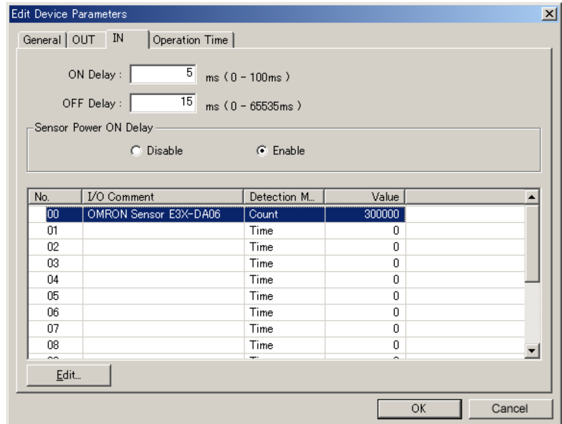
## Setting Using the DeviceNet Configurator

The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

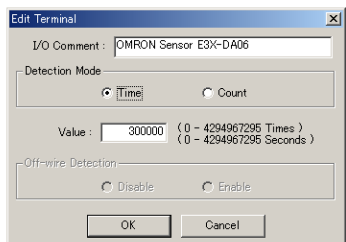
***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

3. Select the **IN** Tab.




4. Double-click the ***I/O Comment*** field of the applicable contact to display the following window. Select ***Time*** under *Detection Mode* and after entering a value in the *Value* field, click the **OK** Button.




5. After checking that the setting for the monitor value is reflected in the Edit Device Parameters Window, select the **General** Tab and click the **Download** Button.
6. Click the **OK** Button.

## 4-3-6 Operation Time Monitor

### Function Overview

**Remote I/O Terminal I/O Unit, Basic I/O Unit + Expansion Unit, Sensor Connector I/O Terminal, or Environment-resistive I/O Terminal**

The Operation Time Monitor can measure the time from when the output contact in the Slave changes to ON to when the input contact changes to ON (unit: ms), and records the time in the Slave. (The Configurator or explicit messages can be used to read the information.)

The Operation Time Monitor allows the operating time to be measured precisely without affecting the communications cycle. The monitor value can be set in the Slave, and when the set monitoring time is exceeded, the Operation Time Over Flag in the Status Area will be turned ON.

(The Configurator or explicit messages can be used to read the status of the Operation Time Monitor Flag.)

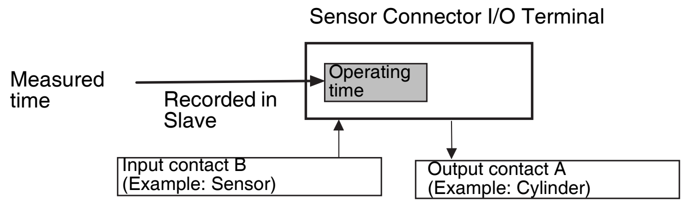
**Note** This function can be used only by Slaves that have I/O combinations, such as a Basic I/O Unit plus an Expansion Unit. (This function cannot be used with the DRT2-□D08(-1) because an Expansion Unit cannot be connected.) For combinations in which the input and output numbers are the same (e.g., input No. 1 and output No. 1 or input No 8 and output No. 8), it measures the time from when the output turns ON until the input turns ON.

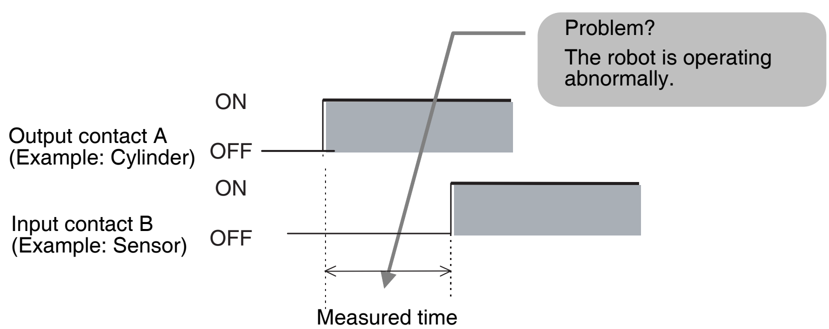
**Three-tier Terminal Block, Environment-resistive Terminal (DRT2-□04CL(-1) Only) MIL Connector Terminal, or Screw-less Clamp Terminal**

The points for measuring the operating time by contact I/O (ON/OFF) timing are the same as for earlier models, but with these Terminals the operating time can be monitored for any combination of contacts (IN-OUT, IN-IN, OUT-OUT) in the Slave.
The trigger edge can be set for either ON to OFF or OFF to ON, and input and output numbers can be freely combined for flexible settings.

**Note** With the I/O-type monitoring function, when the operating time was refreshed the subsequent status might be OFF even if the previous status was ON. With these Terminals, however, the ON status can be retained even when the operating time is refreshed.

- Measured time: 0 to 65535 ms (stored data: 0000 to FFFF Hex)
- Measuring unit: ms



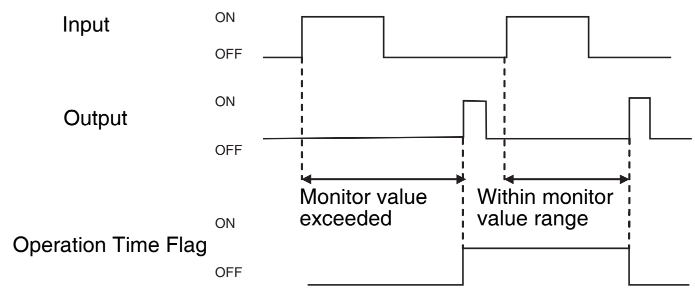




**Note** The precision of the measured time is ±6 ms when the ON delay is 0, and the ON delay time is then added. The display resolution for the measured time (ON delay 10 ms: ±16 ms), is displayed in 2-ms units when the ON delay is 2 ms or less, and in the measuring unit of the set ON delay time when 3 ms or more. (If the ON delay is 5 ms, the display will be for 5 ms, 10 ms, 15 ms, and 20 ms.)

When using a Basic I/O Unit with an Expansion Unit, Sensor Connector I/O Terminal, or Environment-resistive I/O Terminal, be careful of the following point while making the settings.

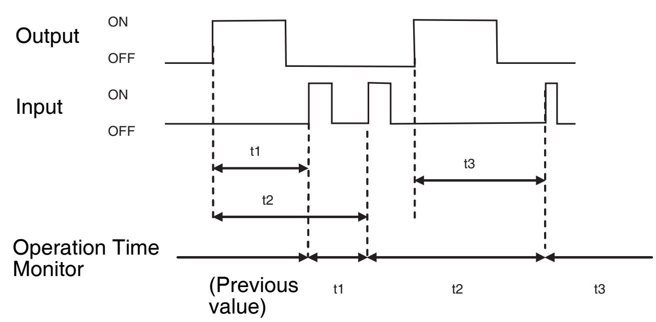
**Note**
1. The Operation Time Monitor Flag is refreshed in real time, so even when the set monitor value is exceeded and the Operation Time Monitor Flag is turned ON, the flag will turn OFF without being held if the time from when the next output changes to ON until the input changes to ON is within the set monitor value range.
   To precisely monitor when the monitor value is exceeded, set the flag in-

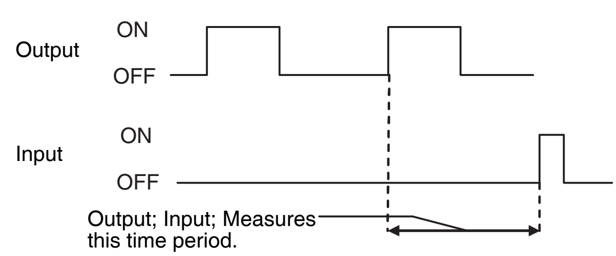
formation to be held in the ladder program.




Be careful of the following point when using a Unit that can use the operation time monitor function (i.e., Basic I/O Unit and Expansion Unit, Sensor Connector I/O Terminal, Three-tier Terminal Block, MIL Connector Terminal, or Screw-less Clamp Terminal).

2. The operating time is recorded as soon as the time has been measured from when the output changes to ON to when the input changes to ON. The time until the next output changes to ON, however, continues being measured internally, and the measurement value will be refreshed if the input changes to ON again before the next output changes to ON. (When an input occurs during the operation time for a reciprocating operation such as a cylinder, the measurement for the operating time (outward path) may be refreshed during the return time (return path).
   When an output changes to ON twice consecutively, and is followed by the input changing to ON, the time is measured from when the second output changes to ON until the input changes to ON.




## Setting Using the DeviceNet Configurator

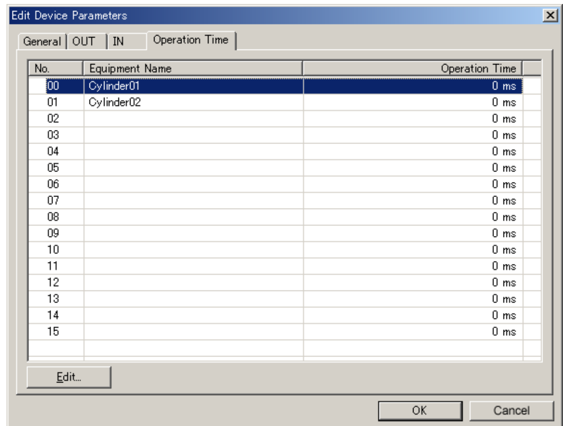
The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

### Basic I/O Unit Combined with Expansion Unit, Sensor Connector I/O Terminal, or Environment-resistive I/O Terminal

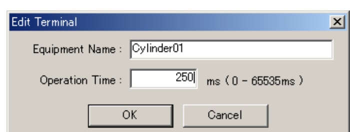
***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.

2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **Operation Time** Tab.




4. Double-click the *Equipment Name* field of the applicable device to display the following window.
   Enter the set value in the *Operation Time* field and click the **OK** Button.



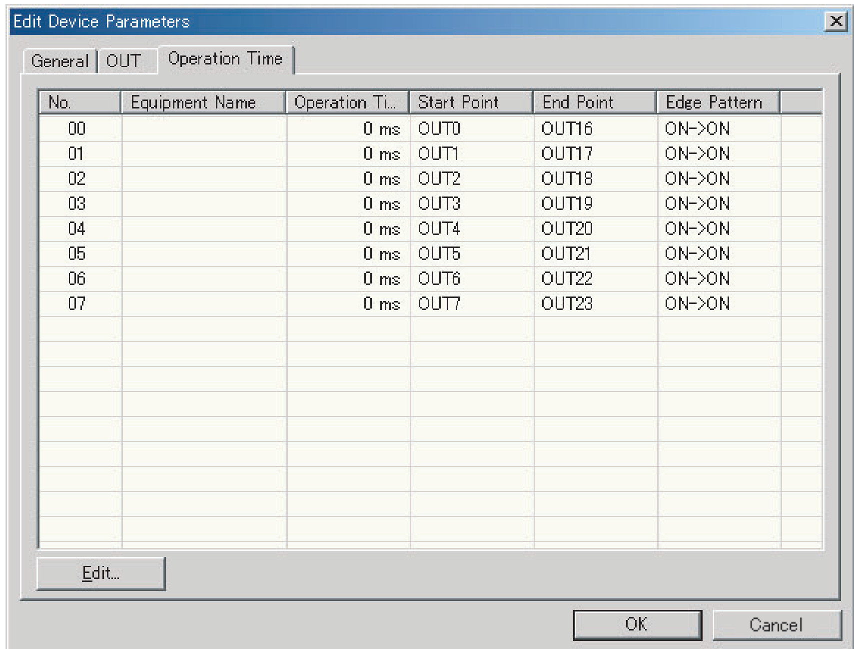

5. Check that the value set in the *Operation Time* field is reflected in the Edit Device Parameters Window. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

### Three-tier Terminal Block, MIL Connector Terminal, Screw-less Clamp Terminal

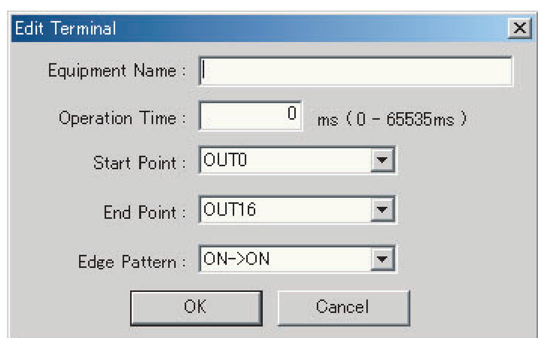
***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

3. Select the **Operation Time** Tab.




4. Double-click the *Equipment Name* field of the applicable device to display the following window.
   Enter the set value in the *Operation Time* field and select the monitor contact numbers for the starting point and ending point from the pull-down menu. The edge pattern can be set for monitoring at either the ON edge or the OFF edge. Finally click the **OK** Button.




5. Check that the value set in the *Operation Time* field is reflected in the Edit Device Parameters Window. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

## 4-3-7 Sensor Disconnected Detection

DRT2-ID□□C-1, DRT2-ID□□SLH-1, and DRT2-MD32SLH-1

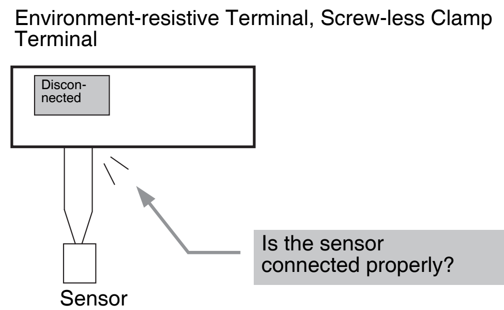
### Function Overview

The I/O power supply current can be monitored and, for Screw-less Clamp Terminals, a sensor disconnection will be detected if the current drops to 0.3 mA or lower per input connector (0.5 mA or lower, at 2 contacts per connector for an Environment-resistive 16-point Input Terminal). The connector that has a disconnected contact can be checked according to the LED indicators on the Slave Unit. (Refer to the information below.)

When a disconnection is detected, the Sensor Disconnected Flag in the Status Area will turn ON. The Configurator or explicit messages can be used to read the status of the Sensor Disconnected Flag, and to read the status of the disconnected contact.

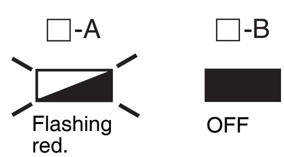
The Configurator or explicit messages can be used to enable or disable the sensor disconnected detection for each contact. (Sensor disconnected detection is disabled in the factory setting.)

Disconnection of the signal line for three-wire sensors cannot be detected by this function. (A disconnected power line can be detected, however.) Disconnection may be falsely detected for sensors (dry contacts such as limit switches or relays, and some other two-wire proximity sensors) with a current consumption of 0.3 mA or lower (0.5 mA or lower for Environment-resistive Terminals), so always disable this function when using these sensors.




**I/O Indicator Status when Disconnection is Detected**

**Environment-resistive Terminals**




The box indicates the number of the corresponding connector.

**Note**

1. Refer to *SECTION 6 Environment-resistive Slaves* for the position of the actual indicator.
2. For 16-point Input Units, the settings cannot be set to both enable and disable within the same connector.
3. After a sensor disconnection is detected, a delay of up to 1.2 s will occur before the Sensor Disconnected Flag turns ON.

**Screw-less Clamp Terminals**


## Setting Using the DeviceNet Configurator

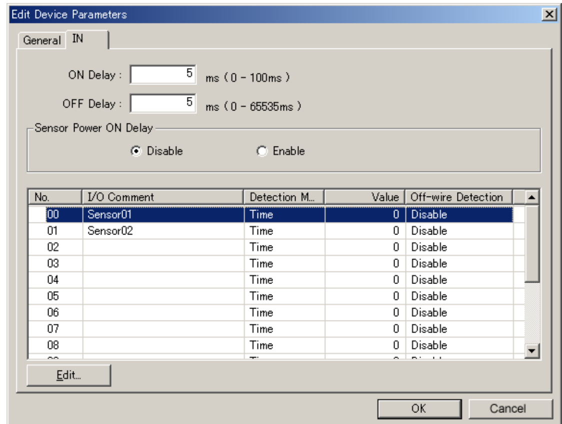
The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

***1,2,3...***

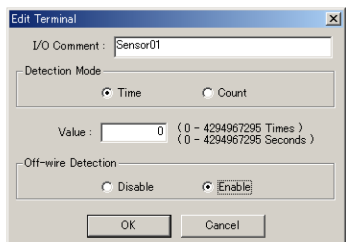
1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

3. Select the **IN** Tab.




4. Double-click the name of the applicable terminal to display the following window. Enable off-wire (disconnection) detection and click the **OK** Button.




5. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

## 4-3-8 Detection of Sensor Power Short-circuit

DRT2-ID□□C(-1), DRT2-ID16S(-1), DRT2-MD16S(-1), DRT2-ID□□SLH(-1), and DRT2-MD32SLH(-1)

### Function Overview

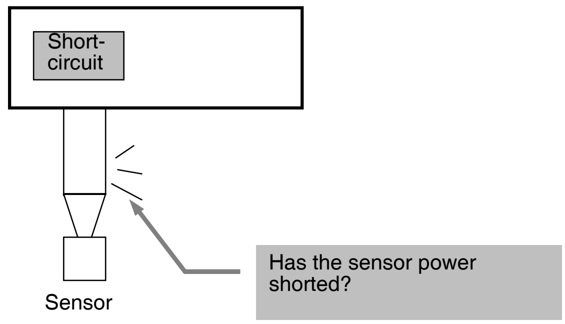
The sensor power supply current can be monitored, and when the current reaches or exceeds 100 mA per input contact (two contacts per connector for a 16-point Environment-resistive Input Terminal), a sensor power short-circuit is detected.

If a sensor power short-circuit is detected when using Environment-resistive Terminals or Screw-less Clamp Terminals, the sensor power output is forced OFF for the contact. (Input contacts that have not short-circuited will continue to operate normally.) The indicators on the Slave can be used to check which contacts have been detected with power short-circuits. (Refer to the information below.)

If a short-circuit is detected in any of the contacts when a Sensor Connector Terminal is being used, the I/O power is turned OFF for the entire short-circuit detection circuit (i.e., one set of two contacts). Check whether a sensor power short-circuit has been detected using the indicators on the slave.

When a sensor power short-circuit is detected, the Sensor Power Short-circuited Flag in the Status Area will turn ON. The Sensor Power Short-circuited Flag can be read using the Configurator or explicit messages. The sensor will automatically recover when the cause of the short-circuit is removed, and the power output to the connector where the short-circuit was detected will turn ON.

Environment-resistive Terminal, Sensor Connector Terminal, or Screw-less Clamp Terminal



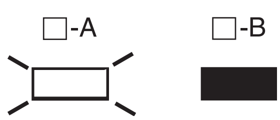

**Note** Use a Power Supply Unit with a rated power supply of 50 W for the communications power supply. A short-circuit is detected when the Unit's sensor power output current reaches or exceeds 100 mA per input connector. When a short-circuit occurs, the communications power supply may be temporarily interrupted. After a short-circuit has been detected, the power will be automatically restored, but during the power interruption use an external circuit in the configuration to make sure the system is operating safely.

Use the following equations to calculate the sensor’s current consumption.

Total network current = Total Unit current consumption + Total sensor current consumption

Communications power supply capacity ≥ Total network current + Short-circuit detection current (= 100 mA) x (DeviceNet network voltage)

#### I/O Indicator Status when Short-circuit is Detected (Environment-resistive Terminal Input Units)




The box indicates the number of the corresponding connector.

**Note**
1. Refer to *SECTION 6 Environment-resistive Slaves* for the position of the actual indicator.
2. After a sensor short-circuit is detected, a delay of up to 1.2 s will occur before the Sensor Power Shorted Flag is turned ON.

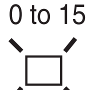
#### SHT0 Indicator Status when Short-circuit Is Detected (Sensor Connector Terminal Input Units and I/O Units)

This indicator lights red when a short-circuit error is detected.

#### I/O Indicator Status when Short-circuit is Detected (Screw-less Clamp Terminal Input Units, Mixed Units)

This indicator lights red when a short-circuit error is detected.

0 to 15



Lit red.

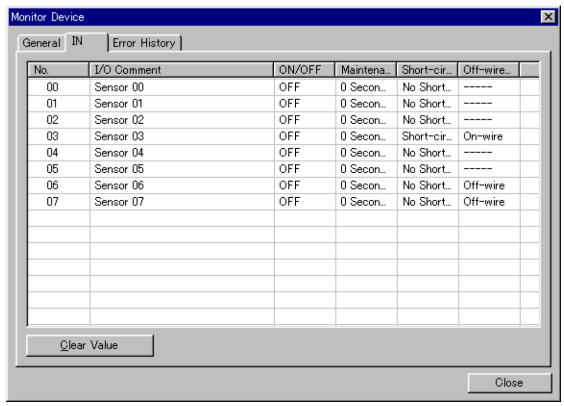
### Checking Using the DeviceNet Configurator

The method used to check information from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

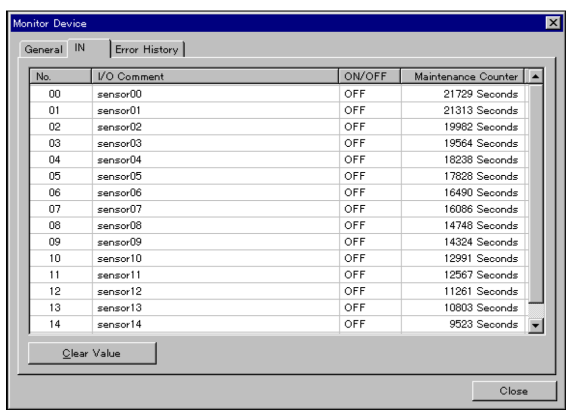
***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. Click the right mouse button over the icon of the DRT2-series Smart Slave to be set in the Network Configuration Window, and select ***Monitor***.
3. Select the **IN** Tab from the Monitor Device Window. When a short-circuit is detected, the short-circuit status will be displayed in the *Short-circuit* field.

**Monitor Device Window for Environment-resistive Terminals**




**Monitor Device Window for Sensor Connector Terminals**

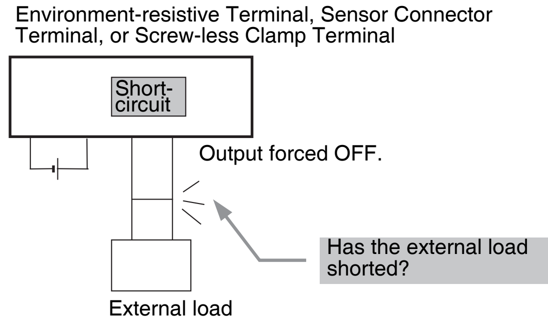



## 4-3-9 External Load Short-circuit Detection

DRT2-OD□□C(-1), DRT2-MD16S(-1), DRT2-OD16SLH(-1), DRT2-OD32SLH-1, and DRT2-MD32SLH-1

### Function Overview

The load current of the Output Unit can be monitored, and an external load short-circuit can be detected when the current drops below a set value per contact (or common). When an external load short-circuit is detected, the output is turned OFF to prevent damage to the Unit's output circuit. With Environment-resistive Terminals, output contacts that have not short-circuited will operate normally. The LED indicators on the Slave Unit can be used to check which contact has been detected as having an external load short-circuit. (Refer to the information below.) Either the Configurator or explicit messages can be used to read which contact has the external load short-circuit. When an external load short-circuit is detected, the Short-circuited Flag in the Status Area is turned ON. (The Configurator or explicit messages can be used to read the status of the Short-circuited Flag.) The Unit will recover when the cause of the short-circuit is removed by automatic or manual recovery. Set the recovery method using the Configurator or explicit messages. (The factory setting is for manual recovery.)




**Note**

1. Refer to *Load Short-circuit Protection: DRT2-OD16SLH and DRT2-OD16SLH-1* on page 223 and *Load Short-circuit Protection: DRT2-OD08C and DRT2-OD08C-1* on page 265 for more information.
2. Environment-resistive Terminals
   The OMRON S8☐☐ Power Supply Unit is recommended for the I/O power supply. The load short-circuit detection function uses the transistor's thermal shutdown, so when a Power Supply Unit with a low-capacity rating or instantaneous shutoff overcurrent protection is used, the load short-circuit may not be detected. Always use a Power Supply Unit with a rating of 100 W or higher if it uses a dropping overcurrent protection characteristic. Always use a Power Supply Unit with a rating of 150 W or higher if it uses intermittent overcurrent protection. The current limiter will protect the transistor even if short-circuit detection is disabled.

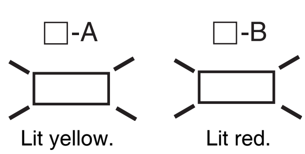
   Sensor Connector Terminals
   The OMRON S8☐☐ Power Supply Unit is recommended for the I/O power supply. If a Power Supply Unit with a dropping overcurrent protection characteristic is used, the load short-circuit may not be detected. Always use a Power Supply Unit with a rating of 100 W or higher if it uses a dropping overcurrent protection characteristic. Always use a Power Supply Unit with a rating of 150 W or higher if it uses intermittent overcurrent protection. The current limiter will protect the transistor even if short-circuit detection is disabled.

### I/O Indicator Status when Short-circuit is Detected (Environment-resistive Terminal Input Units)

#### ■ Automatic Recovery Mode

When the cause of the short-circuit has been removed, the short-circuit protection status will automatically be cleared by rewiring the corresponding contact correctly. After short-circuit detection, the short-circuit protection status will also be cleared automatically by turning OFF the output. The output must remain ON for checking the Status Area and indicators.

**I/O Indicator Status when Short-circuit Detected**



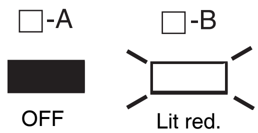

The box indicates the number of the corresponding connector.

**Note** Refer to *SECTION 6 Environment-resistive Slaves* for the position of the actual indicator.

■ **Manual Recovery Mode**

When the cause of the short-circuit is removed and the corresponding contact is correctly rewired, the short-circuit protection status is cleared by turning ON the I/O power or the communications power. When the I/O power is OFF or the output is OFF, the short-circuit protection status is maintained, so the shorted locations can be easily identified from the indicator status during onsite maintenance.

**I/O Indicator Status when Short-circuit Detected**




The box indicates the number of the corresponding connector.

**Note** Refer to *SECTION 6 Environment-resistive Slaves* for the position of the actual indicator.

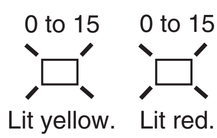
### SHT1 Indicator Status When Short-circuit Is Detected for a Sensor Connector Terminal I/O Unit

This indicator lights red when a short-circuit error is detected.

### I/O Indicator Status When Short-circuit Is Detected for a Screw-less Clamp Terminal I/O Unit

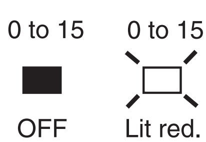
■ **Automatic Recovery Mode**

When the wiring has been corrected to remove the short-circuit, the short-circuit protection status will automatically be cleared. The short-circuit protection status will also be cleared automatically when the output is turned OFF. The output must remain ON to check the Status Area and indicators.




■ **Manual Recovery Mode**

After the wiring has been corrected to remove the short-circuit, the short-circuit protection status is cleared by cycling the I/O power or the communications power. When the I/O power or the output is OFF, the short-circuit protection status will be maintained, so short-circuited locations can be easily identified from the indicator status during onsite maintenance.



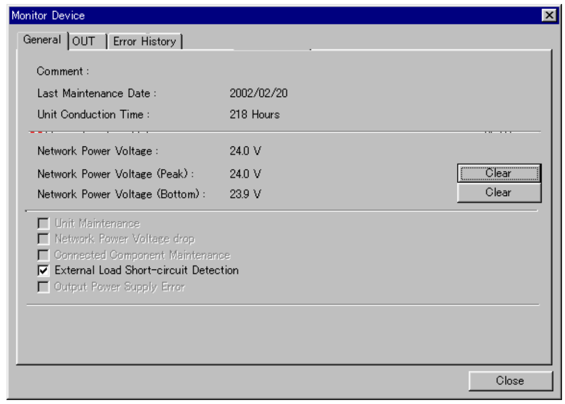

## Checking Using the DeviceNet Configurator

The method used to check information from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

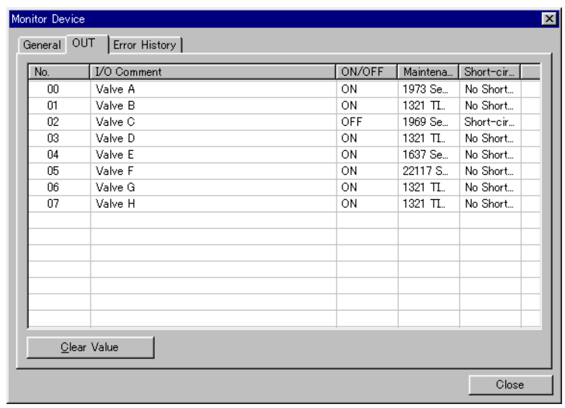
**Checking Shorted Devices** The procedure for this checking method is the same from both the Main Window and the Maintenance Mode Window.

***1,2,3...*** 1. Turn ON the power to the DRT2-series Smart Slave.

2. Click the right mouse button over the icon of the DRT2-series Smart Slave to be set in the Network Configuration Window, and select ***Monitor***.
3. Select the **General** Tab from the Monitor Device Window. If *External Load Short-circuit Detection* is selected, a short-circuit has been detected.




4. When a short-circuit detection has been confirmed, determine which device has shorted from the OUT Tab Page.

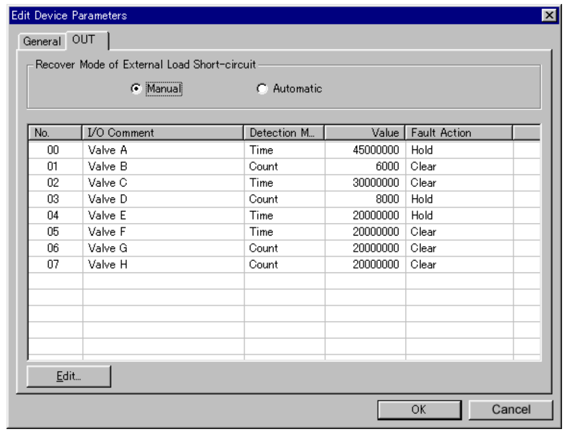



### Setting to Automatic/Manual Recovery Mode (Environment-resistive Terminals Only)

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **OUT** Tab.
   Select either ***Manual*** or ***Automatic*** for the external output load short-cir-

cuit recovery mode and click the **OK** Button.




4. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button.

## 4-3-10 External Load Disconnected Detection

DRT2-OD□□SLH(-1) and DRT2-MD32SLH(-1)

### Function Overview

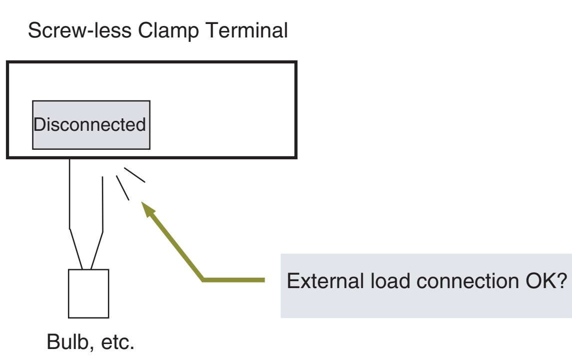
This function monitors the current consumption for the external load and detects an external load disconnection if the current drops below a set value. (See note.) The indicators on the Slave can be used to check which contacts have been detected. (See below.)

When a disconnection is detected, the External Load Disconnected Flag in the Status Area will turn ON. The External Load Disconnected Flag can be read by using the Configurator or explicit messages. Information on the contacts that are disconnected can also be read.

The Configurator or explicit messages can be used to enable or disable this function for each set of contacts. (External load disconnected detection is disabled in the factory setting.)

There are two recovery methods that can be used when an external load disconnection is detected: automatic or manual. The Configurator or an explicit message can be used to set the recovery method to automatic or manual. (The factory setting is for manual recovery.)

**Note** If an external load with low current consumption is connected, a disconnection may not be detected. Disable this function when the output current is 3 mA or less.




**Automatic Recovery Mode** Recovery is automatic when the wiring is corrected.

**Manual Recovery Mode**

Recovery occurs when the wiring is corrected and the I/O power supply is turned back ON.

**I/O Indicator Status when Disconnection is Detected**

0 to 15

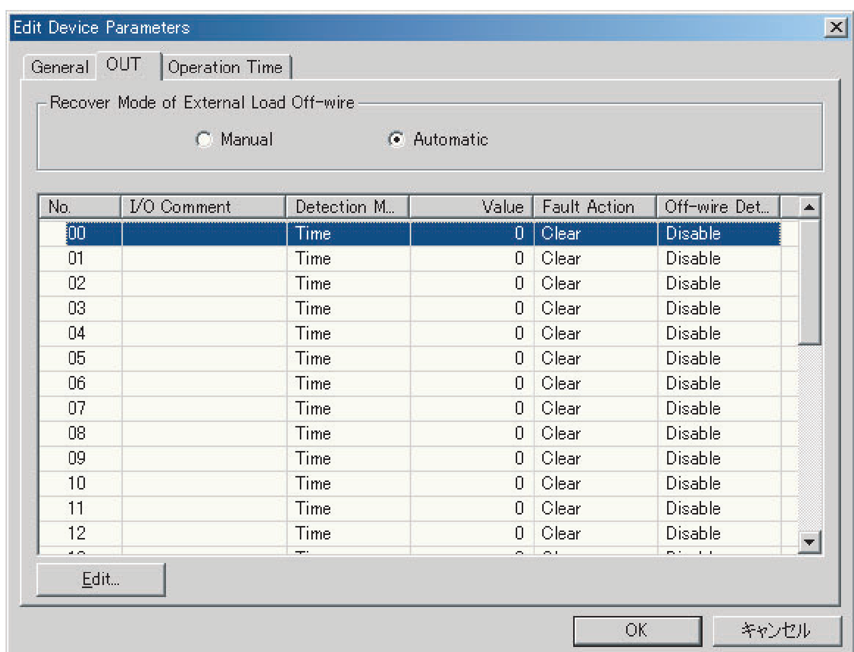
Flashing red.

## Setting Using the DeviceNet Configurator

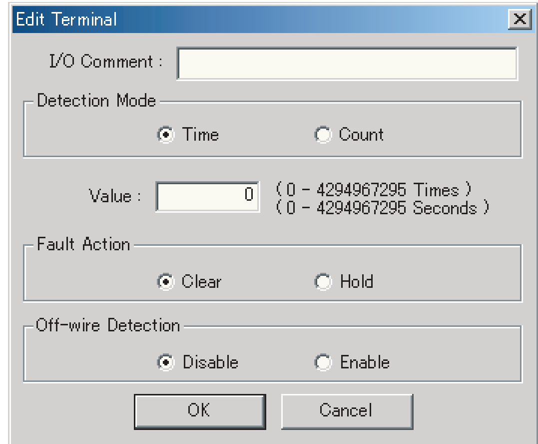
The method used to set values from the DeviceNet Configurator (Ver. 2.20 or later) is described here.

***1,2,3...***

1. Turn ON the power to the DRT2-series Smart Slave.
2. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, click the right mouse button over the icon of the DRT2-series Smart Slave to be set. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
3. Select the **IN** Tab.



4. Double-click the name of the applicable terminal to display the following window. Enable disconnection detection and click the **OK** Button.




5. Select the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button.

# SECTION 5
# General-purpose Slaves

This section provides the specifications and describes the components, terminal arrangements, basic procedures for wiring, and methods for connecting cables of General-purpose Slaves. Information on Slave settings, mounting and wiring methods are also provided separately for each Slave type.

# 5-1 Common Specifications for General-purpose Slaves

The following table lists specifications which are common to all General-purpose Slaves. For details of specifications for each Slave, refer to the following Slave specifications pages.

| Item | Specifications |
|---|---|
| Communications power supply voltage | 11 to 25 V DC<br>(Supplied from the communications connector.) |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) |
| Noise immunity | Conforms to IEC61000-4-4. 2 kV (power lines) |
| Vibration resistance | 10 to 60 Hz, 0.7-mm double amplitude<br>60 to 150 Hz, 50 m/s$^2$<br>For 80 min. in each direction |
| Shock resistance | 150 m/s$^2$, 3 times in each direction |
| Dielectric strength | 500 V AC (between isolated circuits) |
| Insulation resistance | 20 MΩ min. at 250 V DC (between isolated circuits) |
| Ambient temperature | –10 to +55°C |
| Ambient humidity | 25% to 85% (with no condensation) |
| Operating environment | No corrosive gases |
| Storage temperature | –25 to +65°C |
| Mounting | 35-mm DIN Track mounting or M4 screw mounting |
| Mounting strength | 50 N<br>Track direction: 10 N |
| Screw tightening torque | M2 (communications connector lock screws): 0.26 to 0.3 N·m<br>M3 wiring screws: 0.5 N·m<br>M3 mounting screws: 0.5 N·m<br>M4 (Unit mounting screws): 0.6 to 0.98 N·m |

**Note** Some items for the DRT2-ROS16 (Remote I/O Terminal with relay outputs) have different specifications. Refer to *5-5-8 Remote I/O Terminal with 16 Relay Outputs: DRT2-ROS16*.

## 5-1-1 Current Consumption and Weights

The following table lists the current consumption and weights for general-purpose Slaves.

| Model | Communications current consumption | Weight |
|---|---|---|
| DRT2-ID08(-1) | 40 mA max. (24 V DC)<br>70 mA max. (11 V DC) | 135 g max. |
| DRT2-OD08 | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) | 135 g max. |
| DRT2-OD08-1 | 35 mA max. (24 V DC)<br>55 mA max. (11 V DC) | 135 g max. |
| DRT2-ID16(-1) | 40 mA max. (24 V DC)<br>65 mA max. (11 V DC) | 140 g max. |
| DRT2-OD16(-1) | 35 mA max. (24 V DC)<br>60 mA max. (11 V DC) | 140 g max. |
| DRT2-MD16(-1) | 40 mA max. (24 V DC)<br>65 mA max. (11 V DC) | 145 g max. |
| DRT2-ROS16 | 215 mA max. (24 V DC)<br>395 mA max. (11 V DC) | 260 g max. |

| Model | Communications current consumption | Weight |
|---|---|---|
| XWT-ID08(-1)* | 5 mA max. (24 V DC)<br>5 mA max. (11 V DC) | 80 g max. |
| XWT-ID16(-1)* | 10 mA max. (24 V DC)<br>15 mA max. (11 V DC) | 120 g max. |
| XWT-OD08(-1)* | 5 mA max. (24 V DC)<br>5 mA max. (11 V DC) | 80 g max. |
| XWT-OD16(-1)* | 10 mA max. (24 V DC)<br>15 mA max. (11 V DC) | 120 g max. |
| DRT2-ID16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 300 g max. |
| DRT2-OD16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 300 g max. |
| DRT2-MD16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 300 g max. |
| DRT2-ID16S(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 90 g max. |
| DRT2-MD16S(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 95 g max. |
| DRT2-ID16ML(-1) | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) | 85 g max. |
| DRT2-ID16MLX(-1) | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) | 95 g max. |
| DRT2-OD16ML(-1) | 45 mA max. (24 V DC)<br>75 mA max. (11 V DC) | 105 g max. |
| DRT2-OD16MLX(-1) | 45 mA max. (24 V DC)<br>75 mA max. (11 V DC) | 115 g max. |
| DRT2-ID16SL(-1) | 30 mA max. (24 V DC)<br>55 mA max. (11 V DC) | 270 g max. |
| DRT2-OD16SL(-1) | 35 mA max. (24 V DC)<br>65 mA max. (11 V DC) | 270 g max. |
| DRT2-ID16SLH(-1) | 35 mA max. (24 V DC)<br>65 mA max. (11 V DC) | 280 g max. |
| DRT2-OD16SLH(-1) | 35 mA max. (24 V DC)<br>70 mA max. (11 V DC) | 270 g max. |
| DRT2-ID32ML(-1) | 55 mA max. (24 V DC)<br>100 mA max. (11 V DC) | 120 g max. |
| DRT2-OD32ML(-1) | 70 mA max. (24 V DC)<br>120 mA max. (11 V DC) | 100 g max. |
| DRT2-MD32ML(-1) | 60 mA max. (24 V DC)<br>110 mA max. (11 V DC) | 120 g max. |
| DRT2-ID32B(-1) | 45 mA max. (24 V DC)<br>100 mA max. (11 V DC) | 50 g max. |
| DRT2-OD32B(-1) | 55 mA max. (24 V DC)<br>120 mA max. (11 V DC) | 50 g max. |
| DRT2-MD32B(-1) | 50 mA max. (24 V DC)<br>110 mA max. (11 V DC) | 50 g max. |
| DRT2-ID32BV(-1) | 45 mA max. (24 V DC)<br>100 mA max. (11 V DC) | 50 g max. |
| DRT2-OD32BV(-1) | 55 mA max. (24 V DC)<br>120 mA max. (11 V DC) | 50 g max. |
| DRT2-MD32BV(-1) | 50 mA max. (24 V DC)<br>110 mA max. (11 V DC) | 50 g max. |
| DRT2-ID32SL | 55 mA max. (24 V DC)<br>100 mA max. (11 V DC) | 480 g max. |

| Model | Communications current consumption | Weight |
|---|---|---|
| DRT2-ID32SL-1 | 55 mA max. (24 V DC)<br>90 mA max. (11 V DC) | 480 g max. |
| DRT2-OD32SL | 50 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 480 g max. |
| DRT2-OD32SL-1 | 50 mA max. (24 V DC)<br>75 mA max. (11 V DC) | 480 g max. |
| DRT2-MD32SL(-1) | 50 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 480 g max. |
| DRT2-ID32SLH | 65 mA max. (24 V DC)<br>100 mA max. (11 V DC) | 510 g max. |
| DRT2-ID32SLH-1 | 65 mA max. (24 V DC)<br>105 mA max. (11 V DC) | 510 g max. |
| DRT2-OD32SLH | 55 mA max. (24 V DC)<br>80 mA max. (11 V DC) | 500 g max. |
| DRT2-OD32SLH-1 | 55 mA max. (24 V DC)<br>85 mA max. (11 V DC) | 500 g max. |
| DRT2-MD32SLH(-1) | 60 mA max. (24 V DC)<br>90 mA max. (11 V DC) | 510 g max. |

**Note** The communications current consumption indicated for Expansion Units are the additional current consumed when the Expansion Unit is connected to a Basic Unit. For example, the current consumption for a DRT2-ID16 Basic Unit used with an XWT-OD16 Expansion Unit is 40 + 10 = 50mA (24 V DC), 65 + 15 = 80 mA (11 V DC).

# 5-2 Connecting Communications Cables to General-purpose Slaves

Communications cables are connected to General-purpose Slaves using normal square connectors.

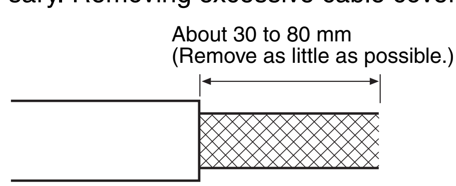
## 5-2-1 Connecting Communications Cables

Use the following procedure to prepare the communications cables and connect them to the connectors.

The same methods are used to connect the cables to connectors with and without set screws.

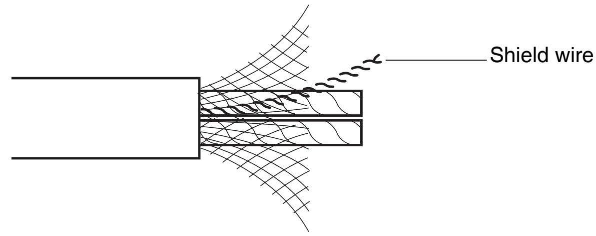
***1,2,3...***

1. Remove about 30 to 80 mm of the cable covering, being careful not to damage the mesh shield underneath. Do not remove more than necessary. Removing excessive cable covering may cause a short-circuit.

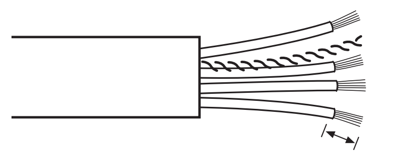



2. Peel back the mesh shield carefully to expose the signal lines, power lines, and the shielding wire. The shielding wire will be loose on the outside of

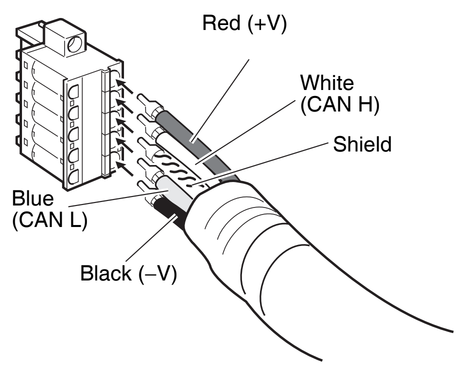
the other lines, but it is harder than the mesh shield and should be easily identified.




3. Remove the exposed mesh shield, remove the aluminum tape from the signal and power lines, and strip the covering from the signal and power lines to the proper length for the crimp terminal connectors. Twist together the wires of each of the signal and power lines.




4. Attach the crimp terminals to the lines and then cover any exposed areas of the cable and lines with electrician's tape or heat-shrinking tubes.
5. Orient the connector properly, loosen the line set screws, and then insert the lines in order: Red, white, shield, blue, and then black.
6. Connectors without set screws do not require lines to be secured with screws as with previous connectors. Push up the orange tab and then insert each line into the back of each hole.
   Release the orange lever after inserting the lines, and gently pull each line to check that it is securely connected to the connector.




There are colored stickers provided on the Master Unit and Slaves that match the colors of the lines to be inserted. Check that the colors of the lines and stickers match when wiring the connectors.

Note The colors used are as follows:

| Color | Signal |
|---|---|
| Red | Power line, positive voltage (+V) |
| White | Communications line, high (CAN H) |
| --- | Shield |

| Color | Signal |
|---|---|
| Blue | Communications line, low (CAN L) |
| Black | Power line, negative voltage (–V) |

**Note** Secure the DeviceNet cable near the Unit to prevent any force from being applied to the Unit's connector.

## Precautions

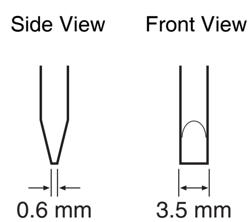
**Recommended Crimp Terminals**

PHOENIX CONTACT, A-/AI-series Crimp Terminals

| Cable type | | Connector type | | | Applicable tool |
|---|---|---|---|---|---|
| | | **XW4B-05C1-H1-D XW4B-05C1-V1R-D MSTB2.5/5-ST-5.08AU** | **XW4B-05C4-TF-D XS4B-05C4-T-D** | **XW4G-05C1-H1-D XW4G-05C4-TF-D** | |
| Thin Cable | Signal line | AI 0.25-6BU | AI 0.25-8YE | AI 0.25-8YE | CRIMPFOX ZA3 |
| | Power line | AI 0.5-6WH | AI 0.5-10WH | AI 0.5-10WH | |
| Thick Cable | Signal line | A1-6 | A1-10 | A1-10 | |
| | Power line | AI 2.5-8BU | AI 2.5-10BU | AI 2.5-10BU | |

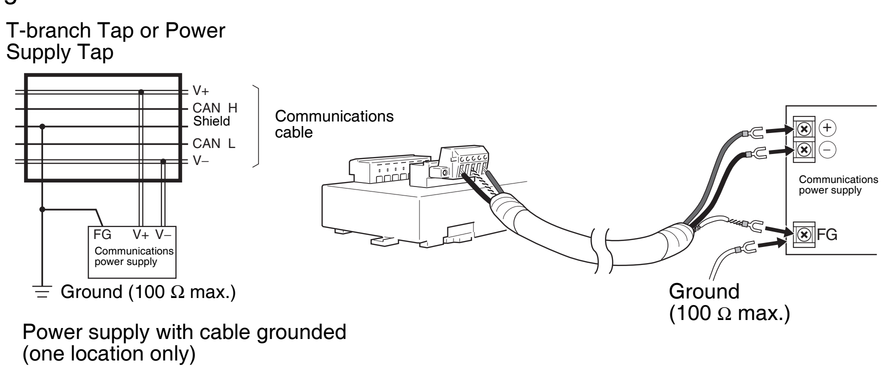
**OMRON XW4Z-00C Screwdriver for Fastening Line Set Screws**

The end of the screwdriver has the following dimensions.




**Supplying Communications Power Using T-branch Taps**

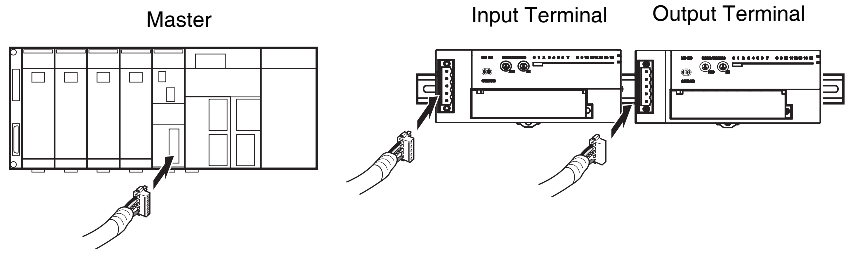
Connect the +V and –V of the power lines to the connectors in the same way as for communications cables. If the communications power supply is in one location only, connect a shield to the connectors when securing them, and ground to 100 Ω max.




## 5-2-2 Connecting Communications Cables to the Nodes

Align the node connector with the cable connector and fully insert the projecting part of the cable connector into the node connector.

Depending on the type of Slave used, the connectors are secured with screws or there is no component for securing the connectors. Always secure the connectors that can be secured with set screws to a tightening torque of 0.25 to 0.3 N·m.



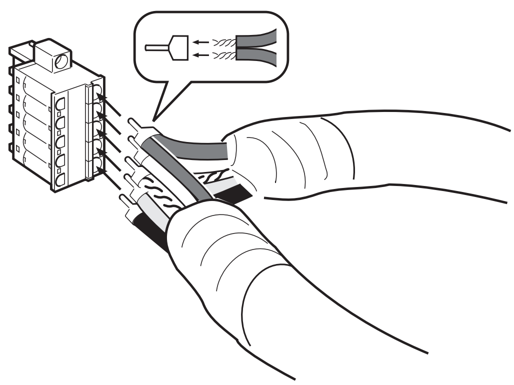

## Precautions

**Multi-drop Connections (Thin Cables)**

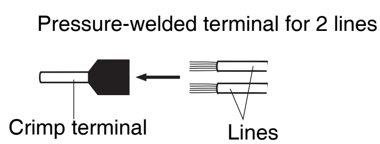
The connectors provided with the Units can be used for multi-drop connections by inserting two lines of the same color into a single hole, as shown in the following diagram.

**Example:**

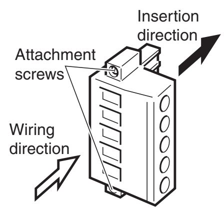
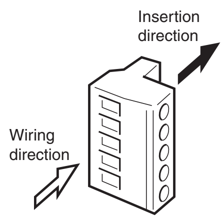
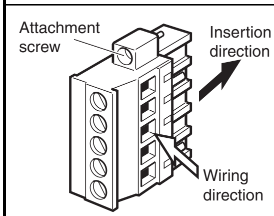
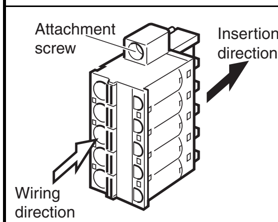
Multi-drop Connection for a Connector without Set Screws



When inserting two lines into the same hole, first insert them together into a pressure-welded terminal, as shown below.



When crimping two wires with one crimp terminal, we recommend the following crimp terminals and crimp tools.

| Connector appearance | Connector model | Crimp terminals | Crimp tool |
|---|---|---|---|
|   | XW4B-05C1-H1-D | AI-TWIN2×0.5-8WH from Phoenix Contact | CRIMPFOX UD6 or CRIMPFOX ZA3 |
|   | MSTB2.5/5-ST-5.08 | | |
|   | XW4B-05C1-V1R-D (See note 1.) | | |
|   | XW4G-05C1-H1-D (See note 2.) | AI-TWIN2×0.5-10WH from Phoenix Contact<br>H0.5/16.5 ZH from Weidmuller | |

Ask the manufacturer for details.

**Note**

1. These Connectors are included as standard features with the following models.

   | | | |
   |---|---|---|
   | · 3G8B3-DRM21 | · DRT1-ID08(-1) | · DRT1-ID16X(-1) |
   | · 3G8E2-DRM21-V1 | · DRT1-OD08(-1) | · DRT1-OD16X(-1) |
   | | · DRT1-ID16(-1) | · DRT1-HD16S |
   | | · DRT1-OD16(-1) | · DRT1-ND16S |
   | | · DRT1-MD16 | |

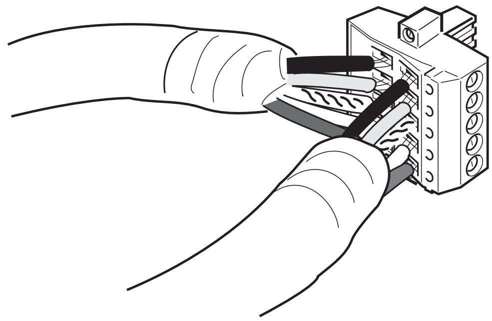
2. These Connectors are included as standard features with DCN1-1NC/3NC T-branch Taps and DRT2-series Terminals.

### Multi-drop Connections with Special Connector (Thin or Thick Cables)

A multi-drop wiring connector (sold separately) can be used to wire a multi-drop connector for either Thin or Thick Cables. This multi-drop wiring connector is required when using Thick Cables, which are too thick for two lines to fit into the connector provided with the Units.

Purchase the multi-drop wiring connector when using Thick Cables for multi-drop connections.

The multi-drop wiring connector cannot be used with Master Units if it will come in contact with Units mounted next to the Master Unit. Use a T-branch Tap to wire the connection instead.



# 5-3 Mounting Terminating Resistors

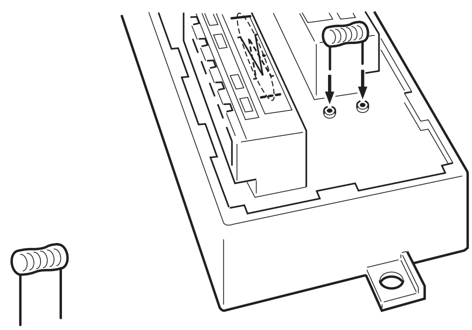
Terminating Resistors must be used at both ends of the trunk line.

A Terminating Resistor is either connected to a T-branch Tap or a Terminal-block Terminating Resistor is connected to a communications cable extended from a node.

## T-branch Tap Terminating Resistors

Terminating Resistors are included with the T-branch Tap.

Insert the Terminating Resistor into the T-branch Tap, as shown in the following diagram. The Terminating Resistor can face either direction.

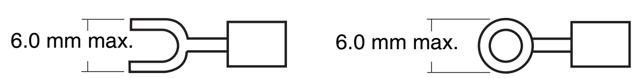


## Terminal-block Terminating Resistors

The DRS1-T Terminal Block has a built-in Terminating Resistor. Attach crimp terminals to the communications cable in the same way as connecting a standard terminal block, and securely screw the terminals to the Terminal-block Terminating Resistor.

Use M3 crimp terminals for the signal wires.

Tighten the screws to a torque of 0.3 to 0.5 N·m.



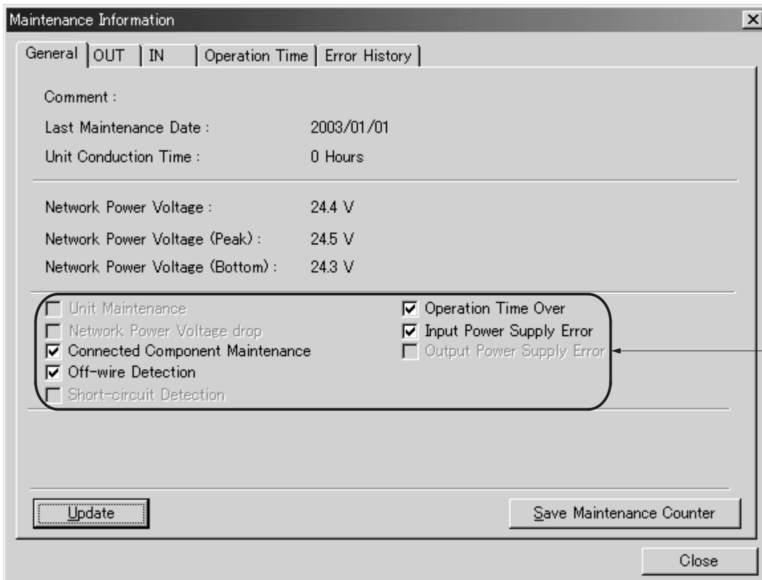

# 5-4 Maintenance Information Window

This section describes the Maintenance Information Window, which can be used to check the status of various general-purpose Slaves. The Monitor Device Window can be used to check the same Slave status information, but the examples in this section uses the Maintenance Information Window. Refer to *4-1-2 Maintenance Mode Window* for details on the differences between the Maintenance Information Window and the Monitor Device Window.

## 5-4-1 Checking Maintenance Information

From the DeviceNet Configurator's Main Window, click the right mouse button and select ***Maintenance Information***. (From the Maintenance Mode Window, double-click the icon of the desired Slave.

### General Window




Status check boxes
(Status flags)

| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the Unit comment. |
| Last Maintenance Date | Displays the last maintenance date that was set. |
| Unit Conduction Time | Displays the total time that the Unit has been ON (cumulative power ON time). |
| Network Power Voltage | Displays the present network power supply voltage. |
| Network Power Voltage (Peak) | Displays the maximum power supply voltage up to the present time. |
| Network Power Voltage (Bottom) | Displays the minimum power supply voltage up to the present time. |
| Update Button | Click this Button to update the Maintenance information. |
| Save Maintenance Counter | This function saves the Maintenance counter value in the Unit. If this function is used, the previous value will be retained when the power supply is turned OFF and ON again. |

**Note** Always update the information when the parameters have been edited or set.

**Status Check Boxes**

The flags (check boxes) shown in the following table will be turned ON when the corresponding error occurs.

| Item | Description |
|---|---|
| Unit Maintenance | ON when the total Unit ON time exceeds the set value. |
| Network Power Voltage Drop | ON when the network power supply voltage falls below the set value. |
| Connected Device Maintenance | ON when any I/O point's Total ON Time Monitor or Contact Operation Counter exceeds its user-set monitor value. |

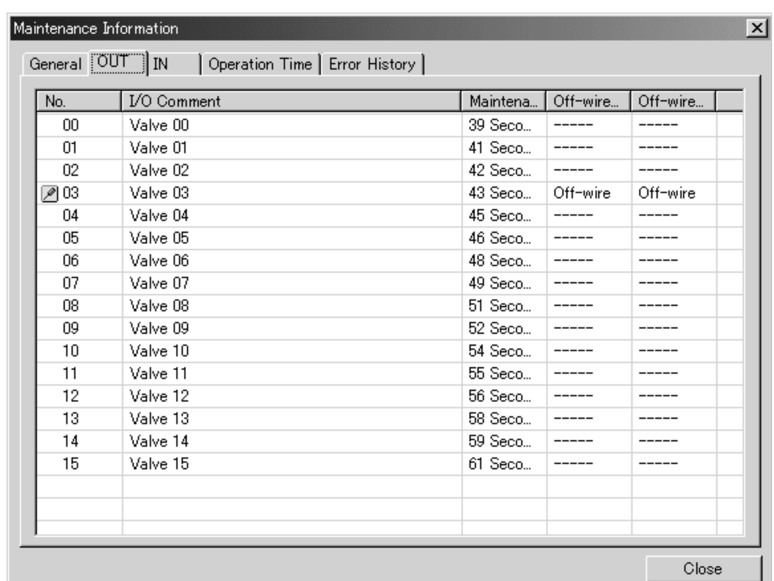
| Item | Description |
|---|---|
| External Load/Sensor Disconnected Detection | ON when the External Load Disconnected Detection or Sensor Disconnection Detection function is triggered.<br>Models supporting External Load Disconnected Detection (for outputs): DRT2-OD□□SLH(-1) and DRT2-MD32SLH(-1) Screw-less Clamp Terminals<br>Models supporting Sensor Disconnected Detection (for inputs): DRT2-ID□□SLH(-1) and DRT2-MD32SLH(-1) Screw-less Clamp Terminals |
| Sensor Power Short-circuit Detection and External Load Short-circuit Detection | ON when the External Load Short-circuit Detection or Sensor Power Short-circuit Detection function is triggered.<br>Models supporting this function (for inputs): DRT2-ID□□SLH(-1), DRT2-MD32SLH(-1), and OD32SLH-1 Screw-less Clamp Terminals and DRT2-ID16S(-1) and DRT2-MD16S(-1) Sensor Connector Terminals<br>(When using a Sensor Connector Terminal, the I/O power supply to the entire Terminal will be turned OFF if a short circuit is detected in even one sensor's power supply.) |
| Operation Time Over | ON when the measured operation time exceeds the user-set monitor value.<br>Basic models*: DRT2-MD16(-1), DRT2-ID16(-1), and DRT2-OD16(-1)<br>Relay output model*: DRT2-ROS16<br>Sensor Connector models: DRT2-MD16S(-1)<br>3-tier I/O Terminal Block models: DRT2-□D16TA(-1)<br>MIL Connector models: DRT2-□D16ML(X)(-1), DRT2-□D32ML(-1),<br>DRT2-□D32B(-1), and DRT2-□D32BV(-1)<br>Screw-less Clamp models: DRT2-□D□□SL(-1) and DRT2-□D□□SLH(-1)<br>*This function can be used in these models only when an Expansion Unit is mounted and the Slave operates as an I/O Unit. |

| Item | Description |
|---|---|
| I/O Power Supply Error (Input) | ON when the input power supply is OFF.<br>Basic models*: DRT2-ID08(-1), DRT2-MD16(-1), and DRT2-ID16(-1)<br>Relay output model*: DRT2-ROS16<br>Sensor Connector models: DRT2-MD16S(-1)<br>3-tier I/O Terminal Block models: DRT2-ID16TA(-1) and DRT2-MD16TA(-1)<br>MIL Connector models: DRT2-ID16ML(X)(-1), DRT2-ID32ML(-1) and DRT2-MD32ML(-1), DRT2-ID32B(-1), DRT2-MD32B(-1), DRT2-ID32BV(-1), and DRT2-MD32BV(-1)<br>Screw-less Clamp models: DRT2-ID□□SL(-1), DRT2-ID□□SLH(-1), DRT2-MD32SL(-1), and DRT2-MD32SLH(-1)<br>*This function can be used for outputs in these models only when an Expansion Unit is mounted and the Slave operates as an I/O Unit. |
| I/O Power Supply Error (Output) | ON when the output power supply is OFF.<br>Basic models*: DTR2-OD08(-1), DRT2-MD16(-1), and DRT2-OD16(-1)<br>Relay output model*: DRT2-ROS16<br>Sensor Connector models: DRT2-MD16S(-1)<br>3-tier I/O Terminal Block models: DRT2-ID16TA(-1) and DRT2-MD16TA(-1)<br>MIL Connector models: DTR2-OD16ML(X)(-1), DRT2-OD32ML(-1), DRT2-MD32ML(-1), DRT2-OD32B(-1), DRT2-MDD32B(-1) DRT2-OD32BV(-1), and DRT2-MD32BV(-1)<br>Screw-less Clamp models: DRT2-OD□□SL(-1), DRT2-OD□□SLH(-1), DRT2-MD32SL(-1), and DRT2-MD32SLH(-1)<br>*This function can be used for outputs in these models only when an Expansion Unit is mounted and the Slave operates as an I/O Unit. |

## Tabs in the Maintenance Information WIndow

**OUT Window**

Terminals are listed in numerical order.



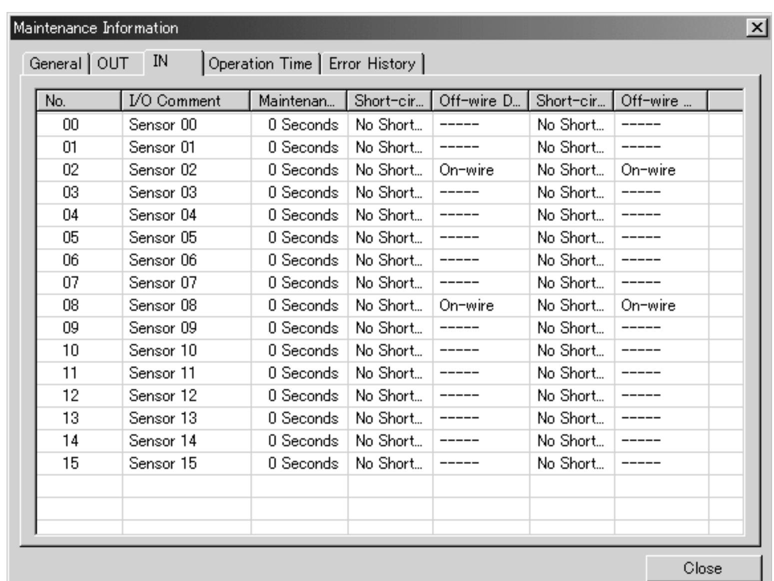
| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the output comment for each output. |
| Maintenance Counter | Displays the maintenance counter for each output. If the maintenance counter exceeds the threshold value, a warning icon will be displayed on the left side of the output's No. column.<br>Total ON Time Monitor: Units = seconds<br>Contact Operation Counter: Units = operations |
| Load Disconnection Detection | If load disconnection detection (off-wire detection) is enabled, either *Not off-wire* or *Off-wire* will be displayed.<br>If off-wire detection is disabled, --- will be displayed. |
| Load Short-circuit Detection | If load short-circuit detection is enabled, either *No short-circuit* or *Short-circuit* will be displayed.<br>If short-circuit detection is disabled, --- will be displayed. |
| Load Disconnection Detection History | Records information when a disconnection occurred. When load disconnections are not being detected, --- will be displayed. |
| Load Short-circuit Detection History | Records information when a short-circuit occurs. When load short-circuits are not being detected, --- will be displayed. |

**Note**

1. The Load Disconnection Detection and Load Disconnection Detection History functions are supported by the following models:
   DRT2-OD□□SLH(-1) and DRT2-MD32SLH(-1) Screw-less Clamp Terminals
2. The Load Short-circuit Detection and Load Short-circuit Detection History functions are supported by the following models:
   DRT2-MD16S(-1) Sensor Connector Terminals and DRT2-OD16SLH(-1) Screw-less Clamp Terminals.

**IN Window**

Terminals are listed in numerical order.




| No. | I/O Comment | Maintenan... | Short-cir... | Off-wire D... | Short-cir... | Off-wire ... |
|---|---|---|---|---|---|---|
| 00 | Sensor 00 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 01 | Sensor 01 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 02 | Sensor 02 | 0 Seconds | No Short... | On-wire | No Short... | On-wire |
| 03 | Sensor 03 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 04 | Sensor 04 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 05 | Sensor 05 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 06 | Sensor 06 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 07 | Sensor 07 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 08 | Sensor 08 | 0 Seconds | No Short... | On-wire | No Short... | On-wire |
| 09 | Sensor 09 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 10 | Sensor 10 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 11 | Sensor 11 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 12 | Sensor 12 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 13 | Sensor 13 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 14 | Sensor 14 | 0 Seconds | No Short... | ----- | No Short... | ----- |
| 15 | Sensor 15 | 0 Seconds | No Short... | ----- | No Short... | ----- |

| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the input comment for each input. |
| Maintenance Counter | Displays the maintenance counter for each input. If the maintenance counter exceeds the threshold value, a warning icon will be displayed on the left side of the input's No. column.<br>Total ON Time Monitor: Units = seconds<br>Contact Operation Counter: Units = operations |

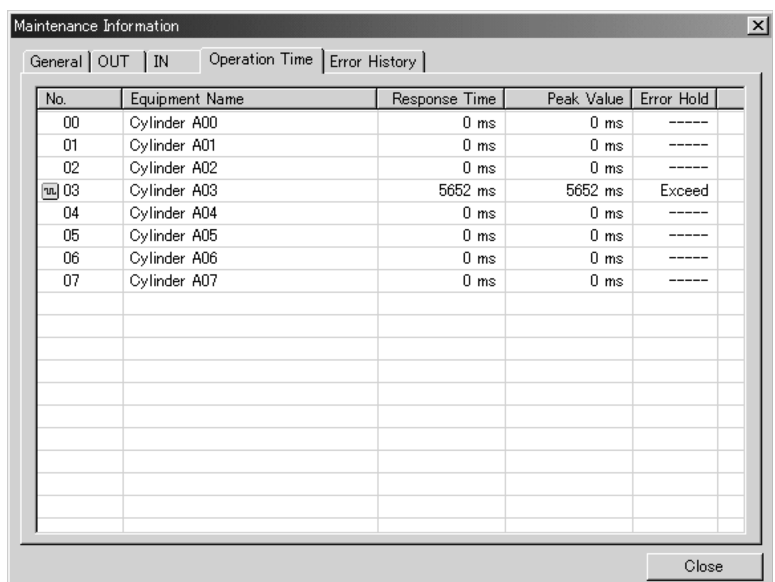
| Item | Description |
|---|---|
| Power Supply Short-circuit | When sensor power short-circuit detection is ON for each input, *Shorted* will be displayed. |
| Disconnection Detection | If sensor disconnection detection (off-wire detection) is enabled for each input, either *Connected* or *Disconnected* will be displayed.<br>If disconnection detection is disabled, --- will be displayed. |
| Power Supply Short-circuit History | Records information when a short-circuit occurred. |
| Disconnection Detection History | Records information when a disconnection occurred even once. |

**Note**

1. The Sensor Disconnection Detection function is supported by the following models:
   DRT2-ID□□SLH(-1) and DRT2-MD32SLH(-1) Screw-less Clamp Terminals
2. The Sensor Power Supply Short-circuit function is supported by the following models:
   DRT2-ID□□SLH(-1) and DRT2-MD32SLH(-1) Screw-less Clamp Terminals and DRT2-ID16S(-1) and DRT2-MD16S(-1) Sensor Connector Terminals

**Operation Time Window**

Terminals are listed in numerical order.




| Item | Description |
|---|---|
| Monitored Device Name | Displays up to 16 characters of text set as the comment for each monitored device. |
| Operation Time | Displays the operation time (in ms) for each device. If the operation time exceeds the threshold, a warning icon will be displayed on the left side of the terminal's No. column. |
| Peak Operation Time | Displays the maximum operation time that has occurred. |
| Error History | If the operation time exceeded the threshold value even once, *Over-threshold* will be displayed. |

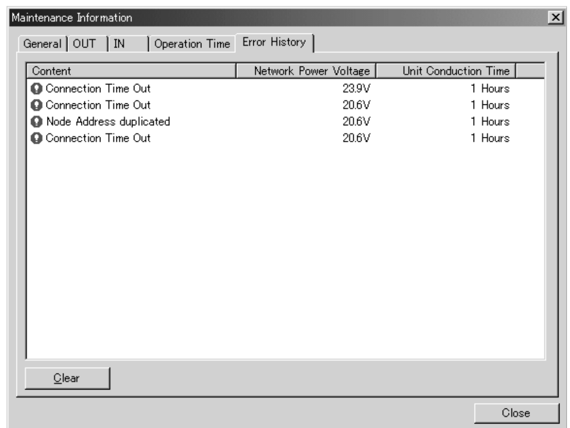
**Note**

1. The Operation Time Monitor function is supported by the following models:
   Basic models: DRT2-MD16(-1), DRT2-ID16(-1), and DRT2-OD16(-1)
   Relay output model: DRT2-ROS16
   (Supported only when an Expansion Unit is mounted and the Slave oper-

ates as an I/O Unit.)
Sensor Connector models: DRT2-MD16S(-1)
3-tier I/O Terminal Block models: DRT2-□D16TA(-1)
MIL Connector models: DRT2-□D16ML(X)(-1), DRT2-□D32ML(-1), DRT2-□D32B(-1), and DRT2-□D32BV(-1)
Screw-less Clamp models: DRT2-□D□□SL(-1) and DRT2-□D□□SLH(-1)

2. The Peak Operation Time and Error History functions are supported by the following models:
3-tier I/O Terminal Block models: DRT2-□D16TA(-1)
MIL Connector models: DRT2-□D16ML(X)(-1), DRT2-□D32ML(-1), DRT2-□D32B(-1), and DRT2-□D32BV(-1)
Screw-less Clamp models: DRT2-□D□□SL(-1) and DRT2-□D□□SLH(-1)

**Error History Window**




| Item | Description |
|---|---|
| Content | Displays the contents of the communications errors that occurred. |
| Network Power Voltage | Displays the power supply voltage being supplied when the error occurred. |
| Unit Conduction Time | Displays the total time that the network power supply had been ON when the error occurred. DRT2-TS04□ only) |
| Clear Button | Clears the error history. |

**Note** The Unit Conduction Time display is supported by the following models:
3-tier I/O Terminal Block models: DRT2-□D16TA(-1)
MIL Connector models: DRT2-□D16ML(X)(-1), DRT2-□D32ML(-1), DRT2-□D32B(-1), and DRT2-□D32BV(-1)
Screw-less Clamp models: DRT2-□D□□SL(-1) and DRT2-□D□□SLH(-1)

# 5-5 Remote I/O Terminals with Transistors

## 5-5-1 Node Address, Baud Rate, and Output Hold/Clear Settings

This section describes the Slaves' node address setting, baud rate settings, and hold/clear outputs for communications error settings. These settings are made as follows:

Node address setting: Rotary switch

Baud rate setting: Automatic follow-up

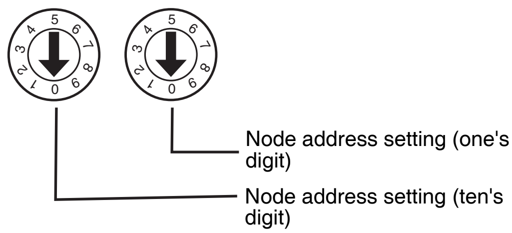
Output hold/clear setting: Software switch

## Node Address Settings

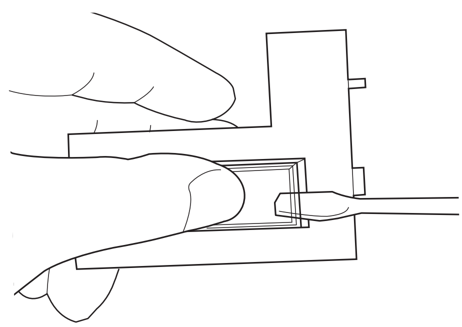
The node address of the Remote I/O Terminal is set as a decimal, using the left rotary switch for the ten's digit, and the right rotary switch for the one's digit. (Up to 63 nodes can be set.)

Node addresses 64 to 99 can be set from the Configurator, using the following method.

**Note**
1. The rotary switch settings are read when the power is turned ON.
2. The rotary switches of the DRT2-□D□□ML(X)(-1) are located on the top of the Terminal. Refer to the *Components of the DRT2-ID32ML and DRT2-ID32ML-1* on page 165 for detalis.

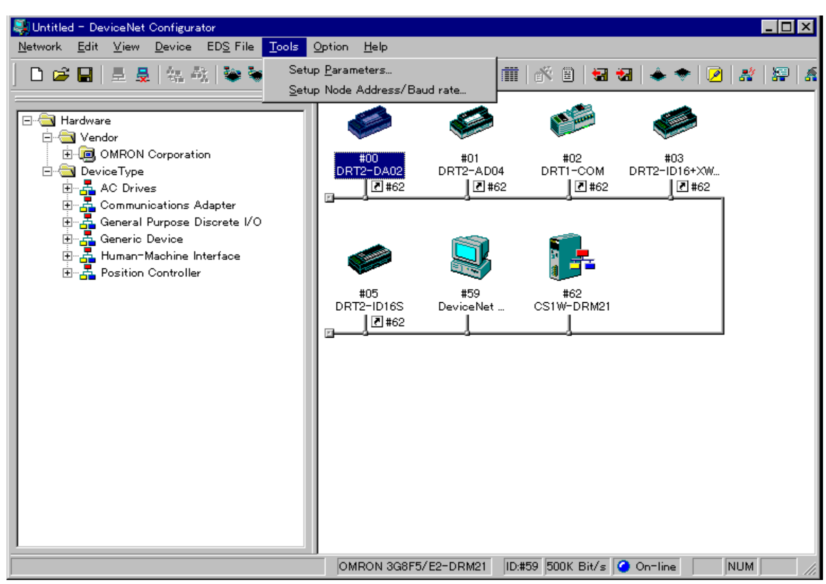



When removing the cover of the rotary switch on the DRT2-□ D □□ ML(X) (-1), press on the cover with your finger to keep from falling while removing with a screwdriver.

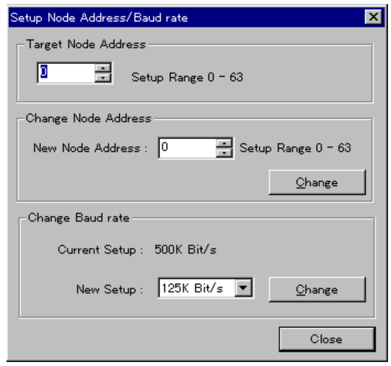


### Setting Node Addresses Using the DeviceNet Configurator

***1,2,3...*** 1. Select ***Setup Node Address/Baud rate*** from the **Tools** Menu.



2. The following window will be displayed. Input the node address of the Unit to be changed and the new node address, and then click the **Change** Button.




**Note** Any node address within the setting range can be used as long as it is not already set for another node. Setting the same node address for more than one node will cause a node address duplication error and communications will not start.

## Baud Rate Setting

The baud rate of the whole system is determined by the baud rate set for the Master Unit. Setting the baud rate for each Unit is not required.

## Output Hold/Clear Setting

Use the Configurator to set the output hold/clear settings. The factory setting is for outputs to be cleared.

OFF (Clear): When a communications error occurs, all of the output data from the Master is cleared to 0.

ON (Hold): When a communications error occurs, the output data from the Master is held at its previous status.

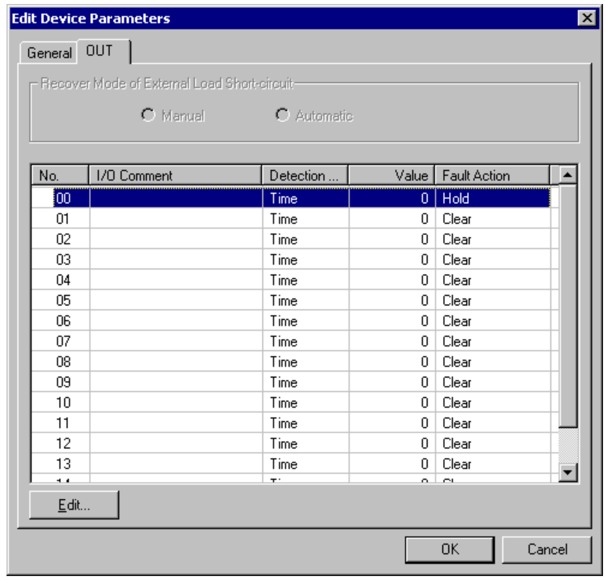
The Output Hold/Clear setting method is shown below.

### Setting Output Hold/Clear from the Configurator

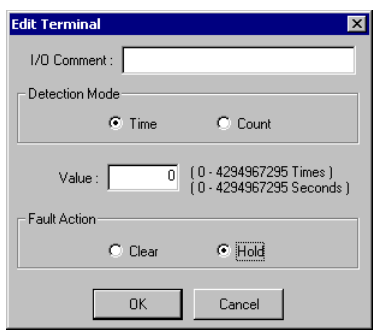
***1,2,3...***

1. From the Main Window, open the Network Configuration Window and double-click or click the right mouse button over the icon of the corresponding DRT2-series Smart Slave. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.
   From the Maintenance Mode Window, open the Network Configuration Window in the Configurator and click the right mouse button over the icon of the corresponding DRT2-series Smart Slave. Select ***Parameter*** and ***Edit*** to display the Edit Device Parameters Window.

2. Select the **OUT** Tab.




3. Double-click the name of the applicable terminal to display the following window.
   Select either *Clear* or *Hold* for the output during a communications error.
   Click the **OK** Button.




4. After checking that the setting that the output during a communications error is reflected in the Edit Device Parameters Window, select the **General** Tab and click the **Download** Button.

## 5-5-2 Increasing I/O Using an Expansion Unit

A single Basic Unit can be combined with a single Expansion Unit.

### Expansion Unit Combinations

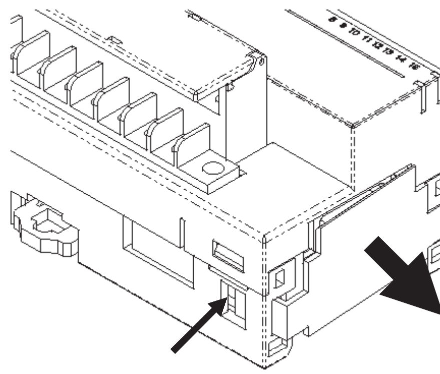
| Basic Unit | Expansion Unit | Inputs | Outputs |
|---|---|---|---|
| DRT2-ID16 | None | 16 | 0 |
| | XWT-ID08-(1) | 24 | 0 |
| | XWT-OD08-(1) | 16 | 8 |
| | XWT-ID16-(1) | 32 | 0 |
| | XWT-OD16-(1) | 16 | 16 |
| DRT2-OD16 | None | 0 | 16 |
| | XWT-ID08-(1) | 8 | 16 |
| | XWT-OD08-(1) | 0 | 24 |
| | XWT-ID16-(1) | 16 | 16 |
| | XWT-OD16-(1) | 0 | 32 |

| Basic Unit | Expansion Unit | Inputs | Outputs |
|---|---|---|---|
| DRT2-ROS16 | None | 0 | 16 |
| | XWT-ID08-(1) | 8 | 16 |
| | XWT-OD08-(1) | 0 | 24 |
| | XWT-ID16-(1) | 16 | 16 |
| | XWT-OD16-(1) | 0 | 32 |

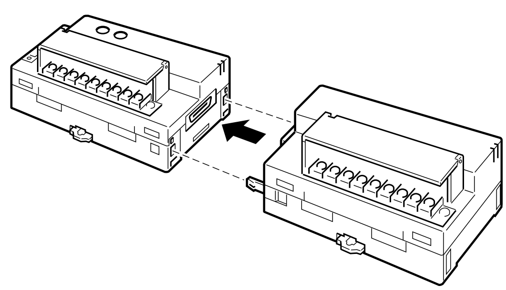
## Mounting Expansion Units

***1,2,3...***

1. Remove the cover from the right side of the Basic Unit.



2. Join the connector of the Expansion Unit directly to the connector of the Basic Unit.



3. Insert the connector of the Expansion Unit securely into the connector of the Basic Unit.

## Supplying I/O Power

When supplying I/O power to an Expansion Unit in a combination of two Input Units (Basic Input Unit and Expansion Input Unit), I/O power is supplied to the Basic Unit only.

For combinations of a Basic Input Unit with an Expansion Output Unit, a Basic Output Unit with an Expansion Input Unit, or two Output Units (Basic Output Unit and Expansion Output Unit), the I/O power must be supplied to both the Basic Unit and the Expansion Unit.

Refer to the following table to determine the correct wiring for the Unit combination being used.

| Device combination | I/O power supply to Expansion Unit |
|---|---|
| Basic Input Unit (IN) + Expansion Input Unit (IN):<br>Example: DRT2-ID16+XWT-ID16 | Not required. (I/O power supply shared with Basic Unit.) (See note 1.) |
| Basic Input Unit (IN) + Expansion Output Unit (OUT):<br>Example: DRT2-ID16+XWT-OD16 | Required. (I/O power supply required for both Units.) |

| Device combination | I/O power supply to Expansion Unit |
|---|---|
| Basic Output Unit (OUT) + Expansion Input Unit (IN):<br>Example: DRT2-OD16+XWT-ID16 | Required. (I/O power supply required for both Units.) |
| Basic Output Unit (OUT) + Expansion Output Unit (OUT):<br>Example: DRT2-OD16+XWT-OD16 | Required. (I/O power supply required for both Units.) |
| Basic Output Unit (OUT) + Expansion Input Unit (IN):<br>Example: DRT2-ROS16+XWT-ID16 | Required. (I/O power supply required for Expansion Unit only.) |
| Basic Output Unit (OUT) + Expansion Output Unit (OUT):<br>Example: DRT2-ROS16+XWT-OD16 | Required. (I/O power supply required for Expansion Unit only.) |

**Note**

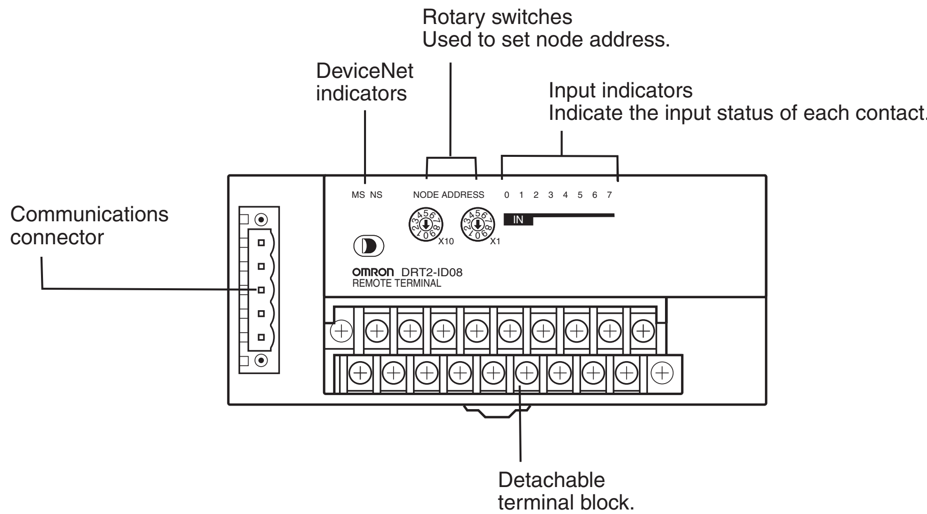
1. When an NPN or PNP Basic Input Unit and NPN Expansion Input Unit are combined, the V terminals of the Basic Input Unit and Expansion Input Unit are connected internally. (Example: DRT2-ID16(-1)+XWT-ID16)
   When an NPN or PNP Basic Input Unit and PNP Expansion Input Unit are combined, the G terminals of the Basic Input Unit and Expansion Input Unit are connected internally. (Example: DRT2-ID16(-1)+XWT-ID16-1)
2. Always turn OFF the power to the Units before connecting an Expansion Unit.

## 5-5-3 Remote I/O Terminals with 8 Transistor Inputs: DRT2-ID08 (NPN) and DRT2-ID08-1 (PNP)

### Input Specifications

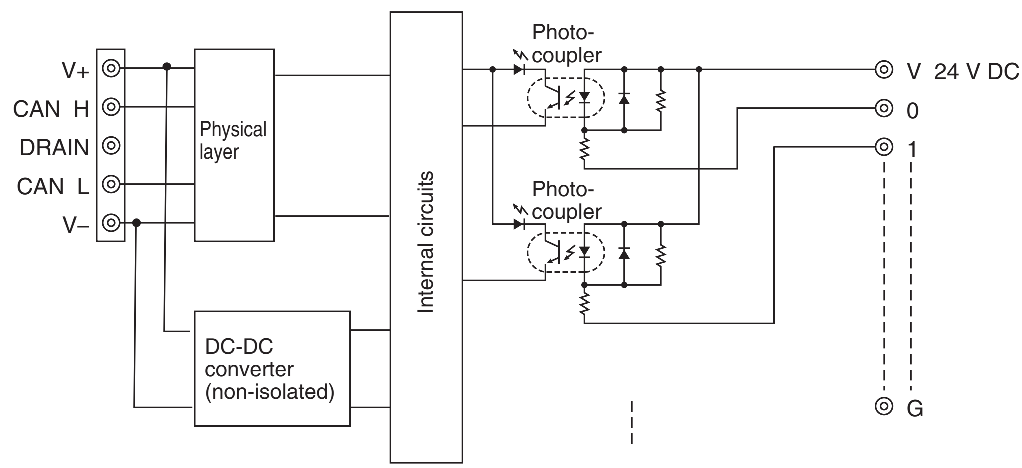
| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID08 | DRT2-ID08-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min.<br>(between each input terminal and V) | 15 V DC min.<br>(between each input terminal and G) |
| OFF voltage | 5 V DC max.<br>(between each input terminal and V) | 5 V DC max.<br>(between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC)<br>3.0 mA max./point (for 17 V DC) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## Component Names and Functions: DRT2-ID08 and DRT2-ID08-1

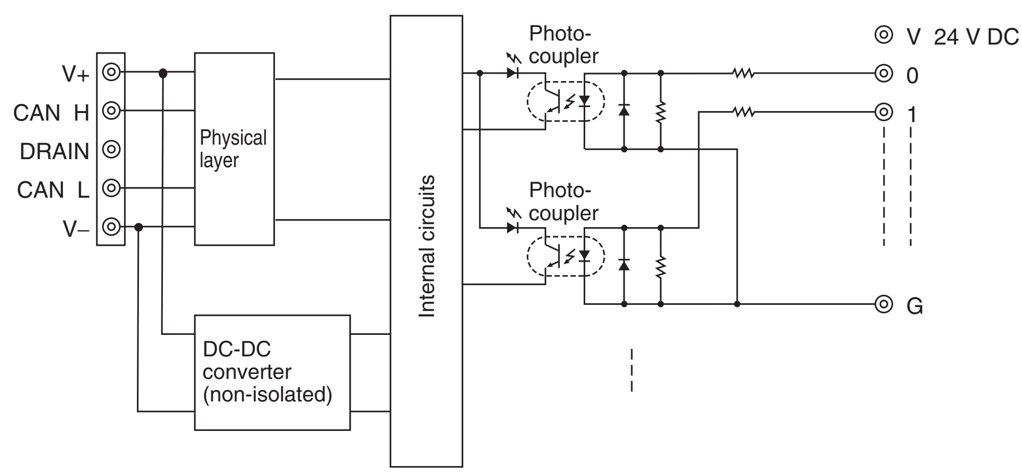



## Internal Circuits

### DRT2-ID08 (NPN)

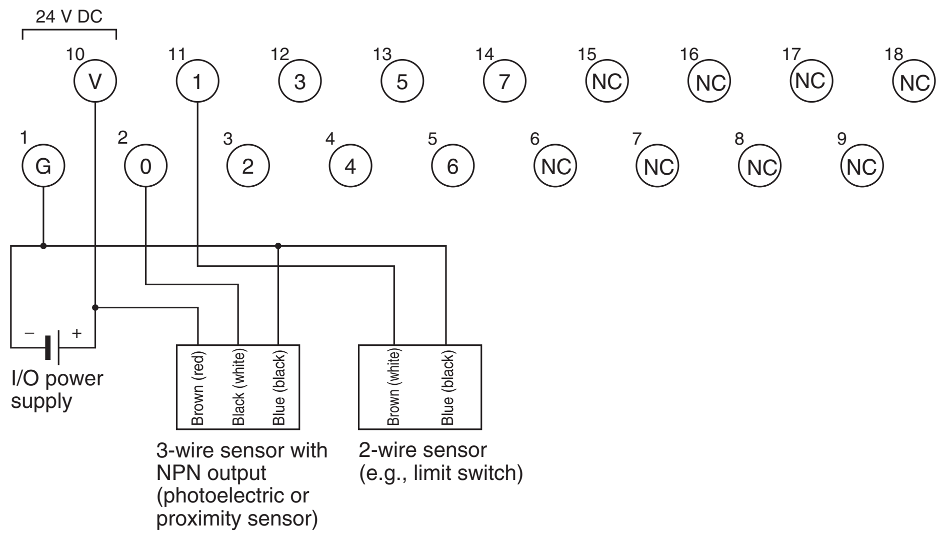



### DRT2-ID08-1 (PNP)

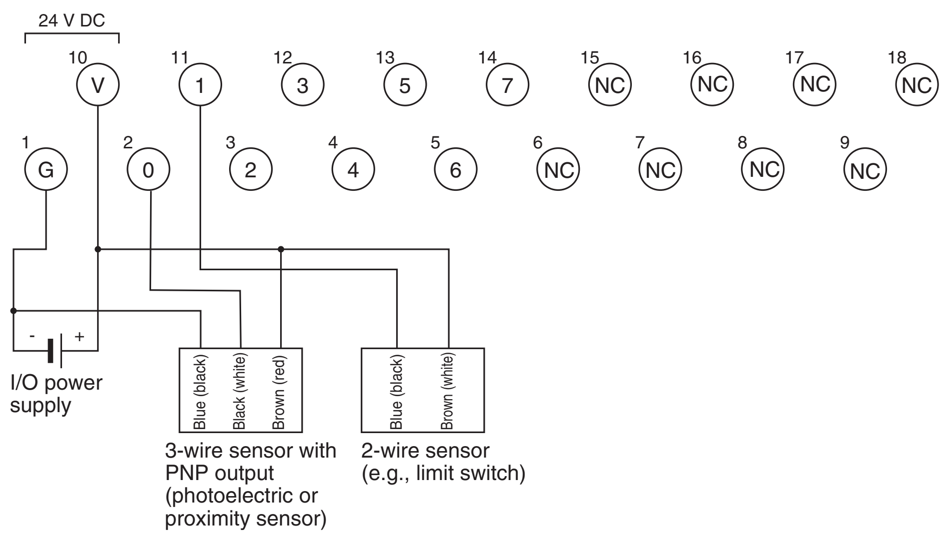


## Wiring

**DRT2-ID08 (NPN)**

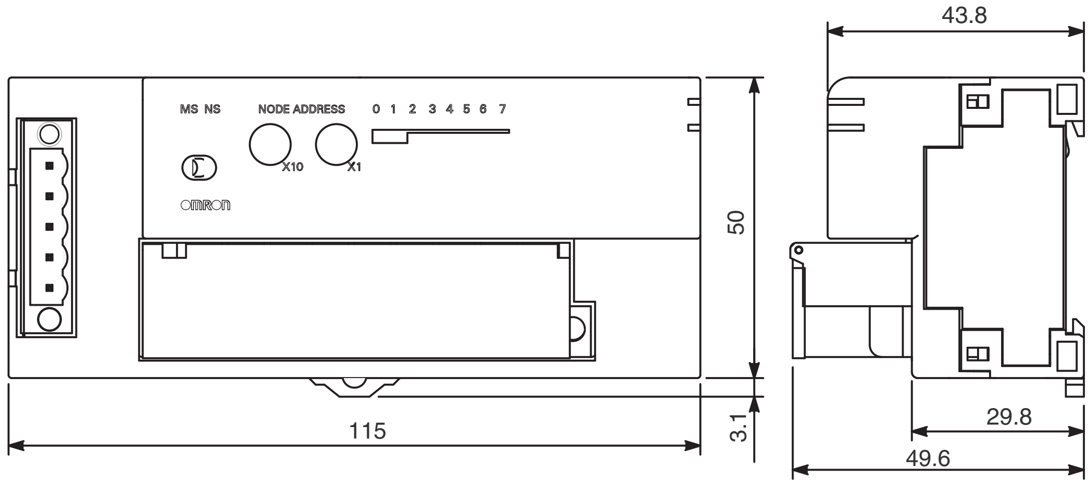



**DRT2-ID08-1 (PNP)**




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-ID08 and DRT2-ID08-1

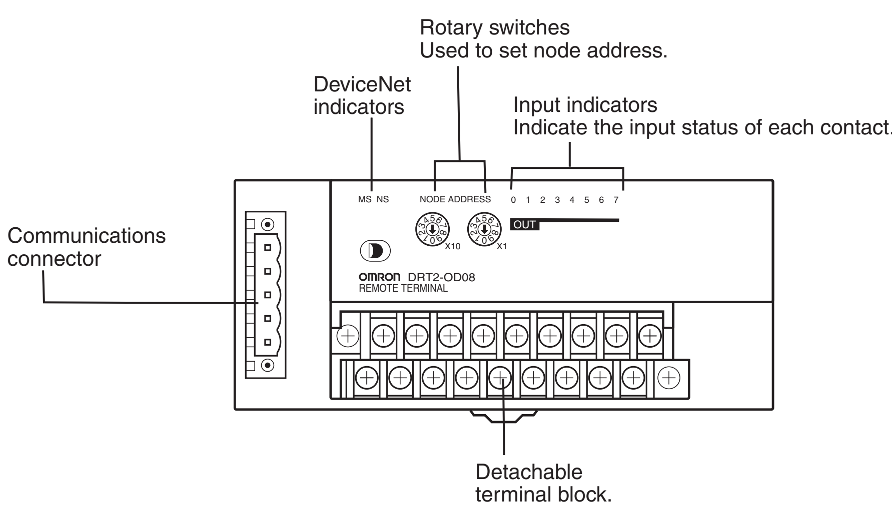



## 5-5-4 Remote I/O Terminals with 8 Transistor Outputs: DRT2-OD08 (NPN) and DRT2-OD08-1 (PNP)

### Output Specifications

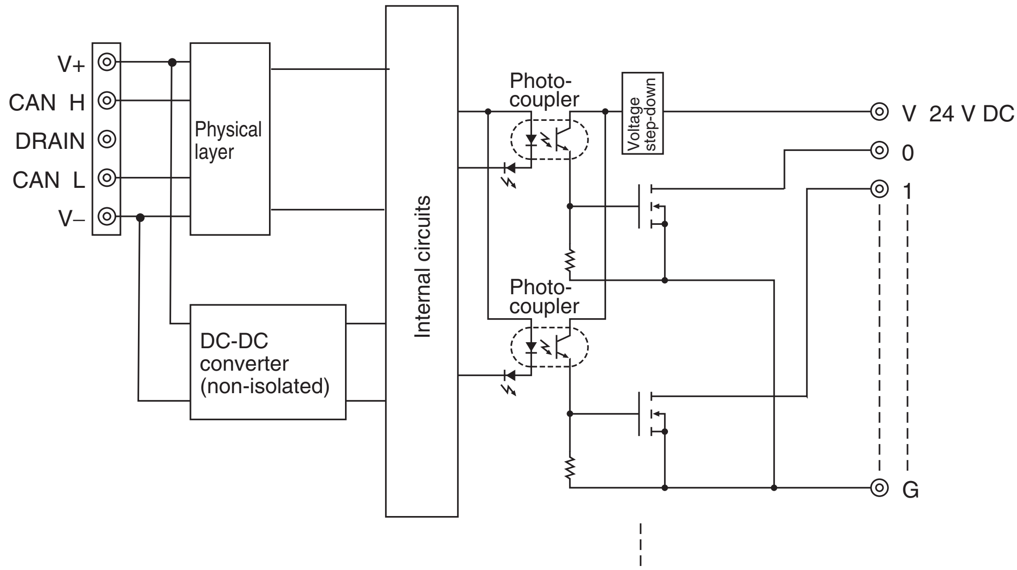
| Item | Specifications | |
|---|---|---|
| Model | DRT2-OD08 | DRT2-OD08-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 0.5 A/point, 4.0 A/common | |
| Residual voltage | 1.2 V max.<br>(at 0.5 A between each output terminal and G) | 1.2 V max.<br>(at 0.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Component Names and Functions: DRT2-OD08 and DRT2-OD08-1

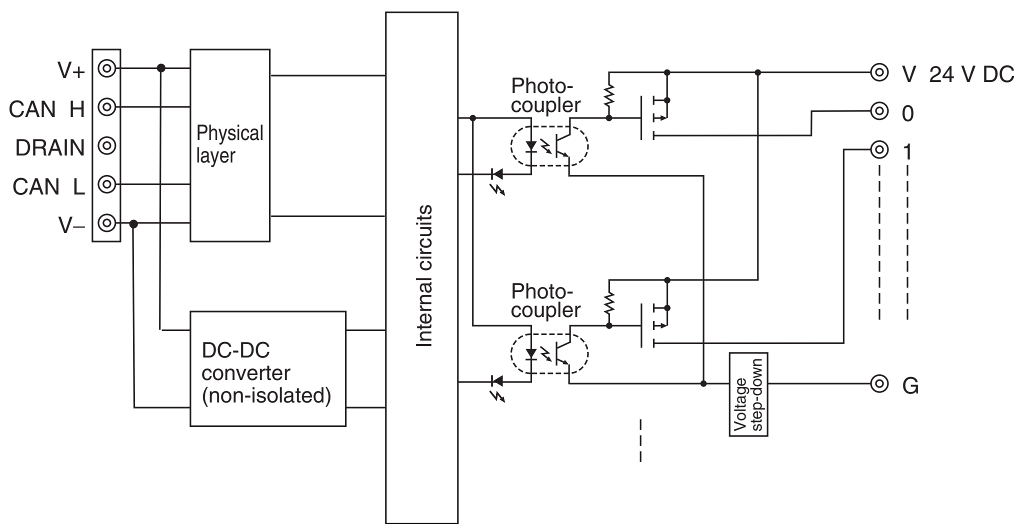


## Internal Circuits

### DRT2-OD08 (NPN)

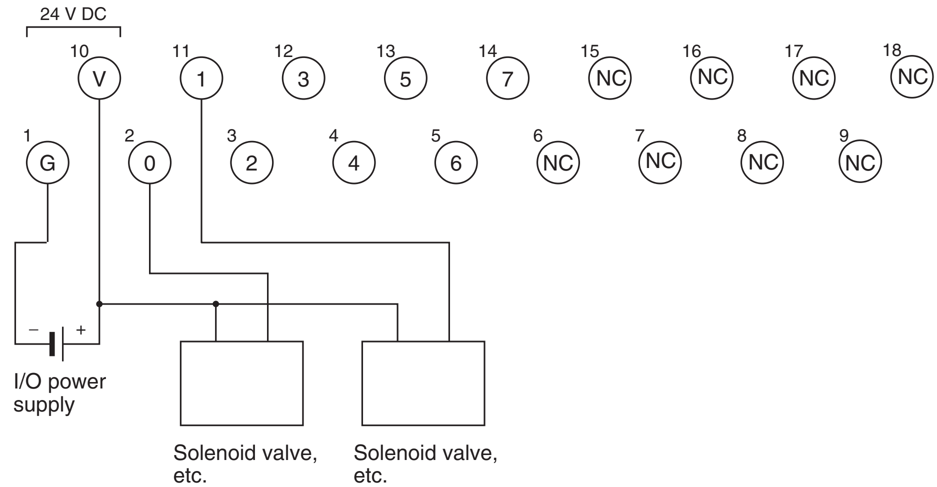



### DRT2-OD08-1 (PNP)

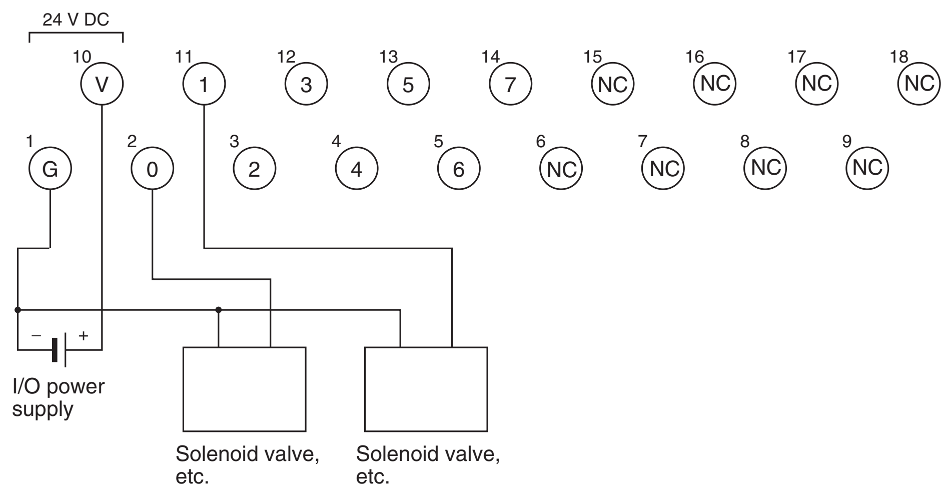


## Wiring

**DRT2-OD08 (NPN)**



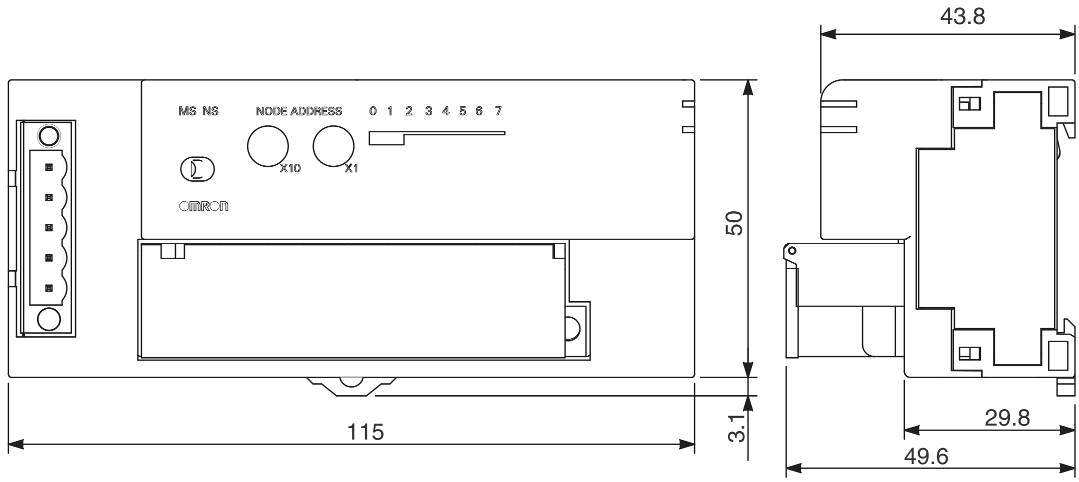

**DRT2-OD08-1 (PNP)**




**Note**

1. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)
2. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-OD08 and DRT2-OD08-1

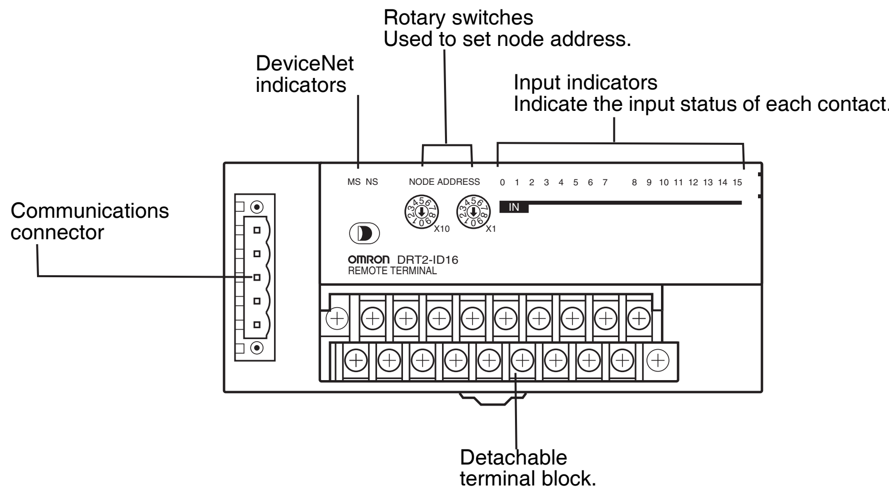



## 5-5-5 Remote I/O Terminals with 16 Transistor Inputs: DRT2-ID16 (NPN) and DRT2-ID16-1 (PNP)

### Input Specifications

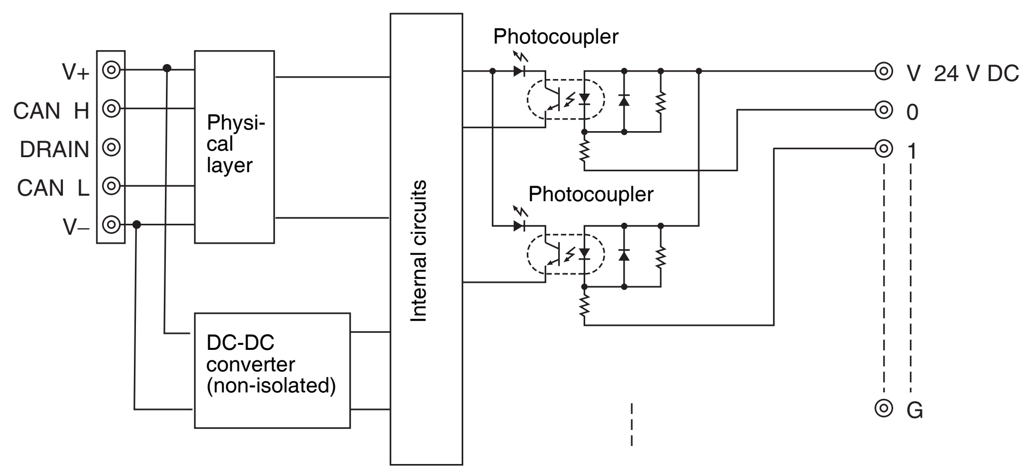
| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID16 | DRT2-ID16-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 15 V DC min.<br>(between each input terminal and V) | 15 V DC min.<br>(between each input terminal and G) |
| OFF voltage | 5 V DC max.<br>(between each input terminal and V) | 5 V DC max.<br>(between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC)<br>3.0 mA min./point (for 17 V DC) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Component Names and Functions: DRT2-ID16 and DRT2-ID16-1

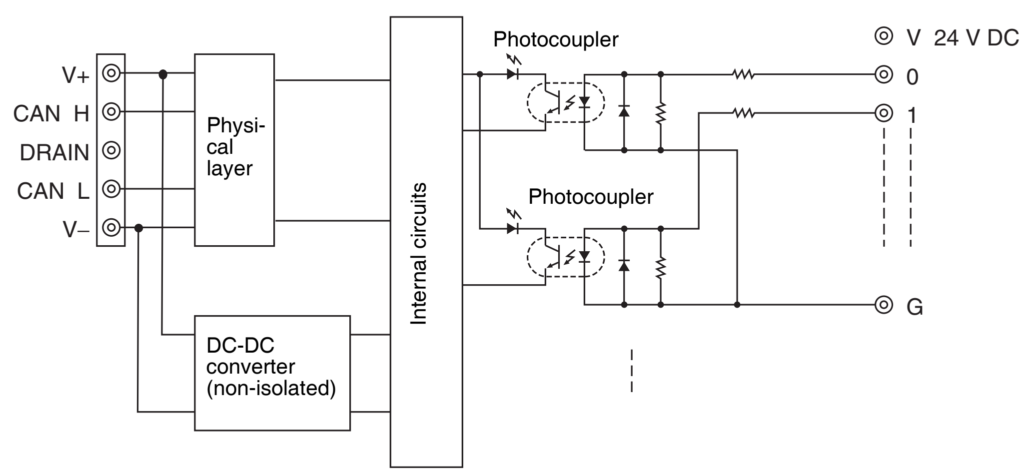



## Internal Circuits

### DRT2-ID16 (NPN)

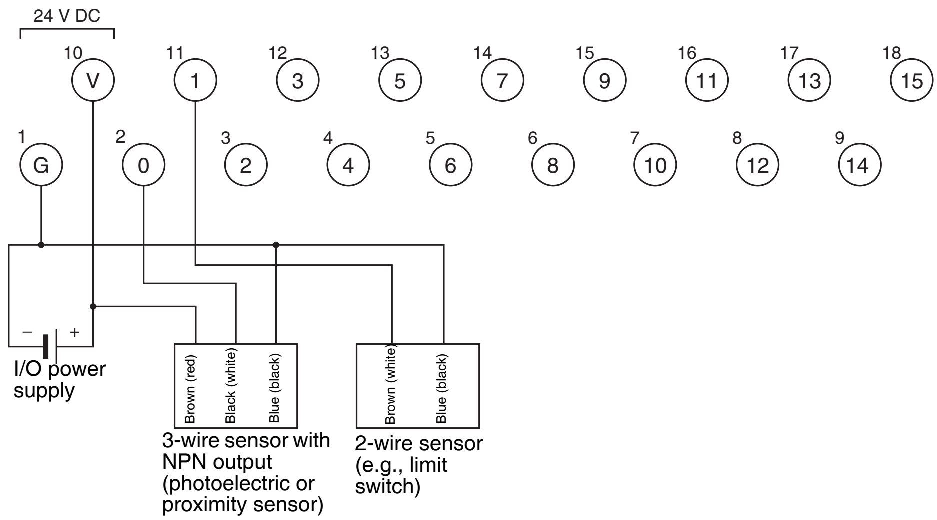



### DRT2-ID16-1 (PNP)

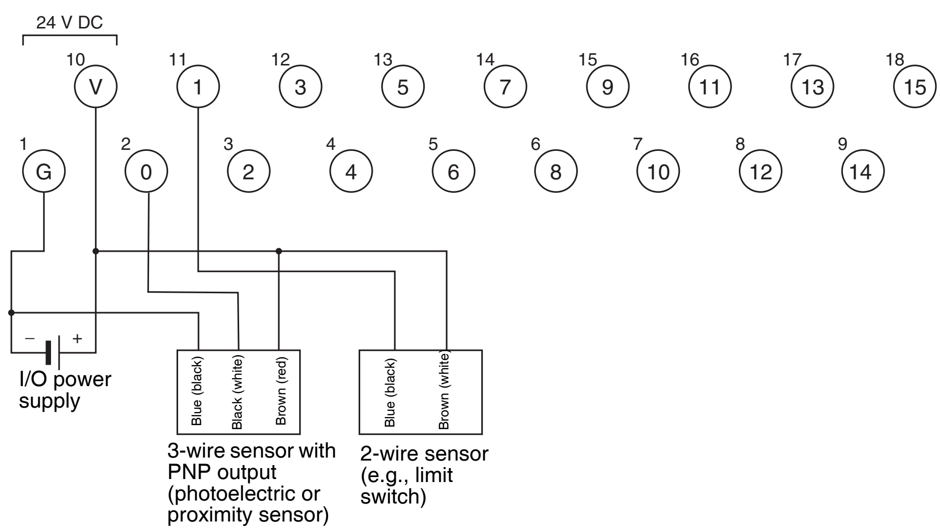


## Wiring

### DRT2-ID16 (NPN)

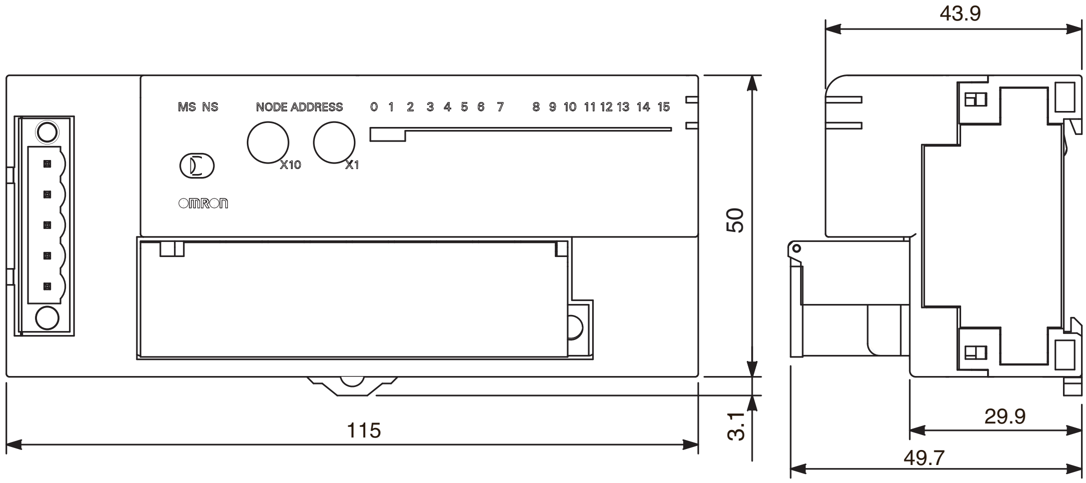



### DRT2-ID16-1 (PNP)




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-ID16 and DRT2-ID16-1

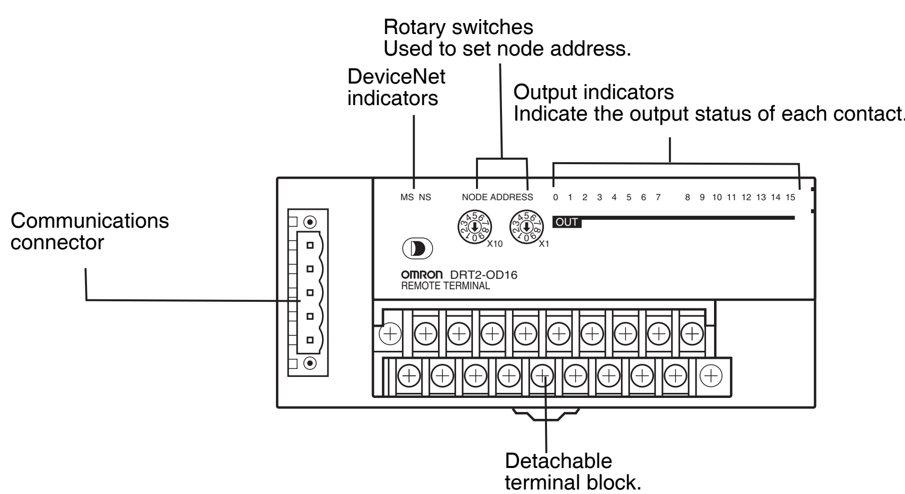



# 5-5-6 Remote I/O Terminals 16 Transistor Outputs: DRT2-OD16 (NPN) and DRT2-OD16-1 (PNP)

## Output Specifications

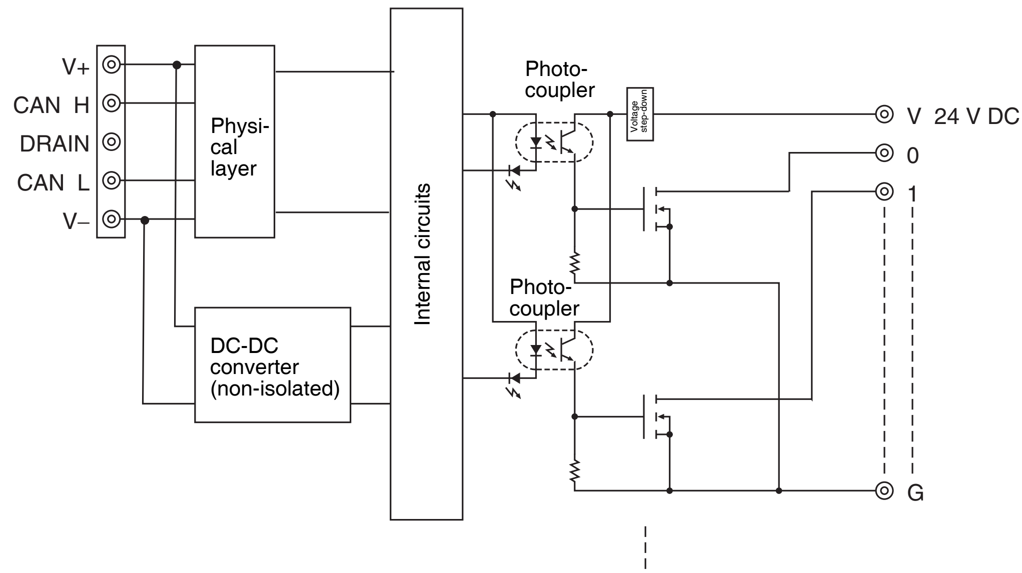
| Item | Specifications | |
|---|---|---|
| Model | DRT2-OD16 | DRT2-OD16-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.5 A/point, 4.0 A/common | |
| Residual voltage | 1.2 V max.<br>(at 0.5 A between each output terminal and G) | 1.2 V max.<br>(at 0.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Component Names and Functions: DRT2-OD16 and DRT2-OD16-1

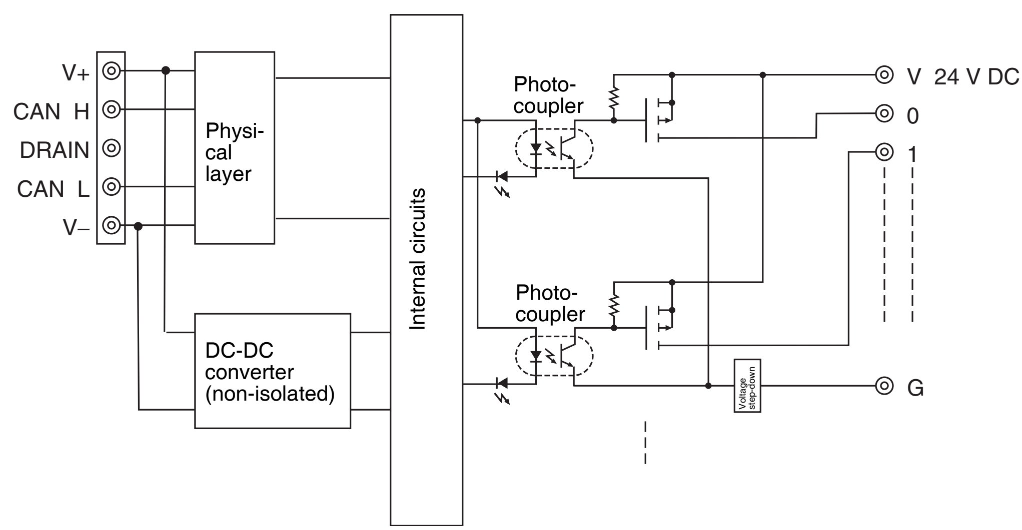


## Internal Circuits

### DRT2-OD16 (NPN)

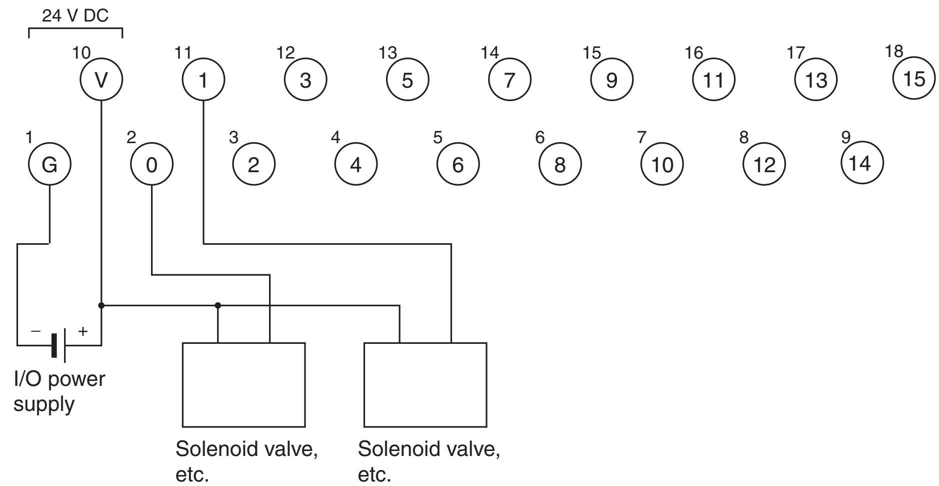



### DRT2-OD16-1 (PNP)

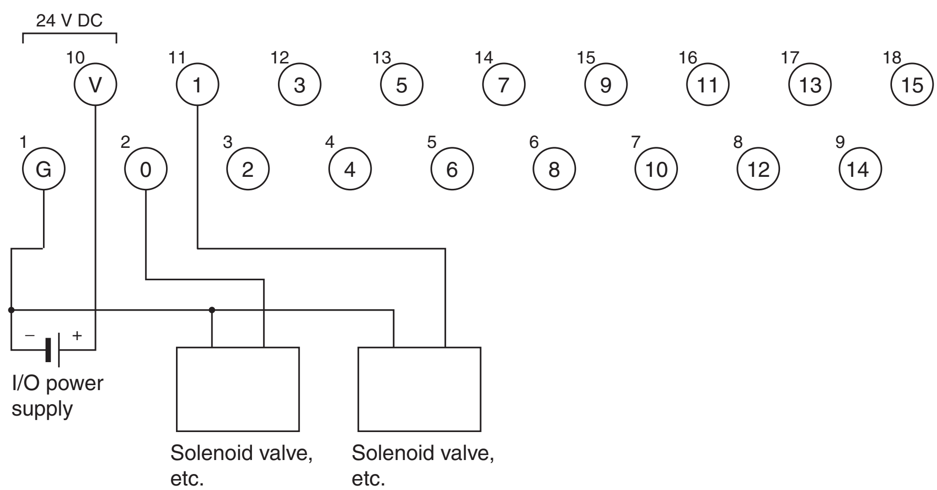


## Wiring

**DRT2-OD16 (NPN)**



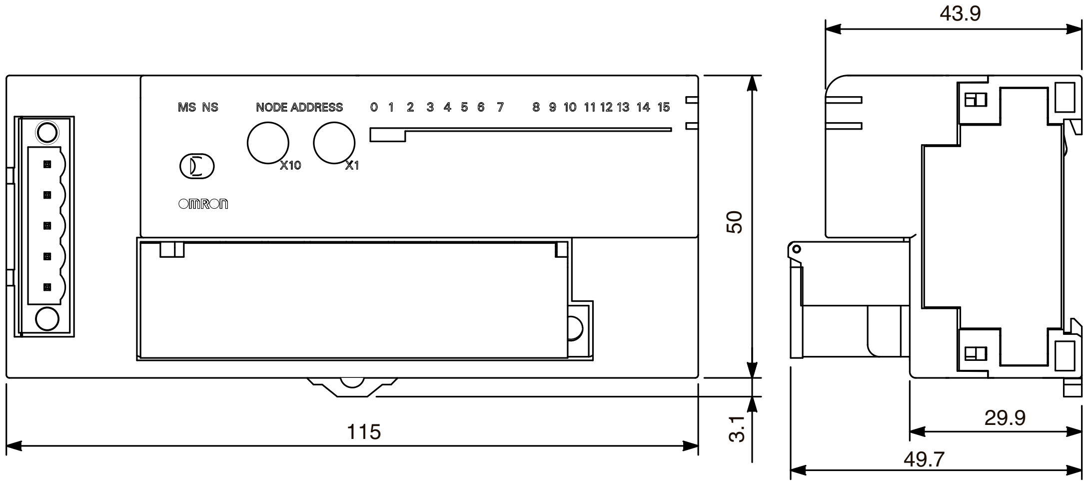

**DRT2-OD16-1 (PNP)**




**Note**

1. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)
2. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-OD16 and DRT2-OD16-1




# 5-5-7 Remote I/O Terminals with 8 Transistor Inputs and 8 Transistor Outputs: DRT2-MD16 (NPN) and DRT2-MD16-1 (PNP)

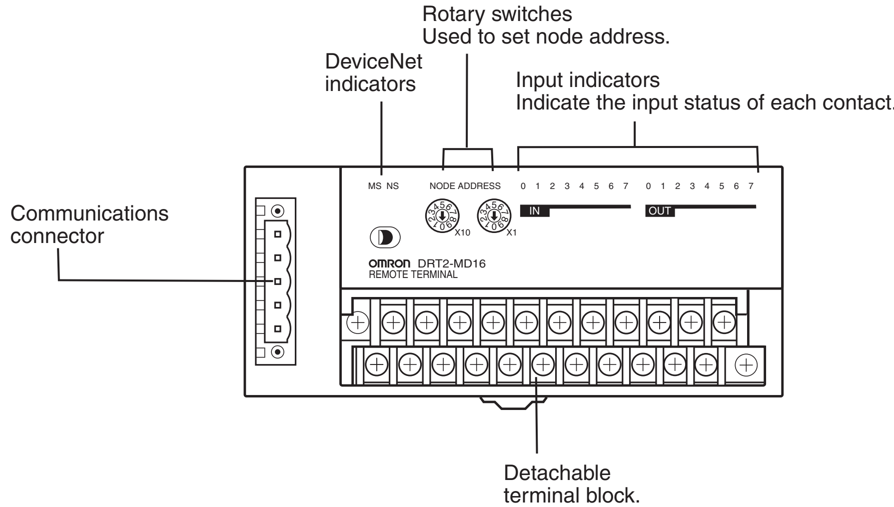
## Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-MD16 | DRT2-MD16-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min.<br>(between each input terminal and V) | 15 V DC min.<br>(between each input terminal and G) |
| OFF voltage | 5 V DC max.<br>(between each input terminal and V) | 5 V DC max.<br>(between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC)<br>3.0 mA min./point (for 17 V DC) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## Output Specifications

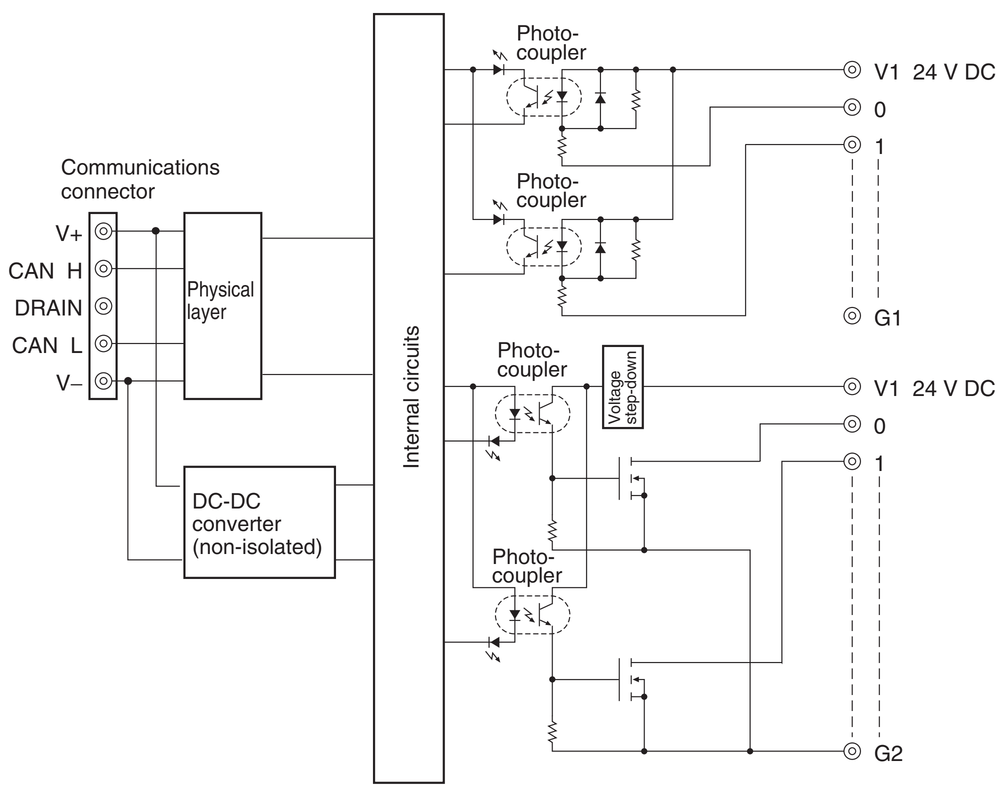
| Item | Specifications | |
|---|---|---|
| Model | DRT2-MD16 | DRT2-MD16-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 0.5 A/point, 4.0 A/common | |
| Residual voltage | 1.2 V max.<br>(at 0.5 A between each output terminal and G) | 1.2 V max.<br>(at 0.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## Component Names and Functions: DRT2-MD16 and DRT2-MD16-1

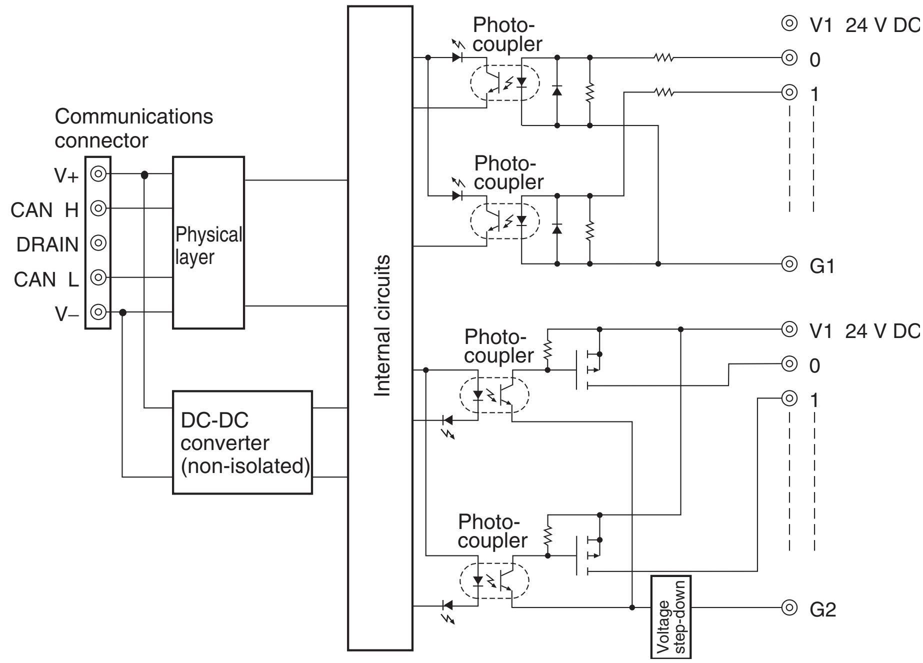



## Internal Circuits

### DRT2-MD16 (NPN)

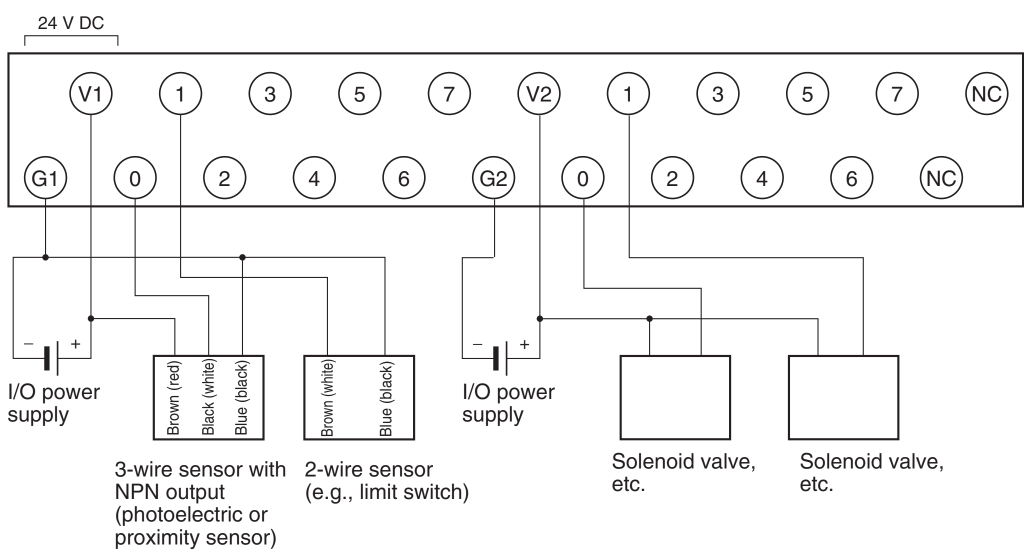


**DRT2-MD16-1 (PNP)**

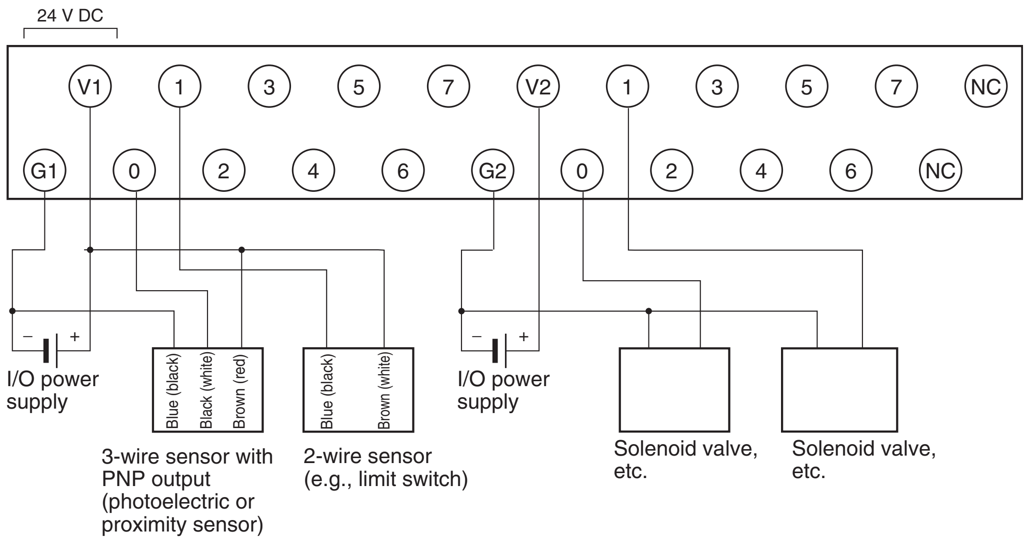



## Wiring

**DRT2-MD16 (NPN)**



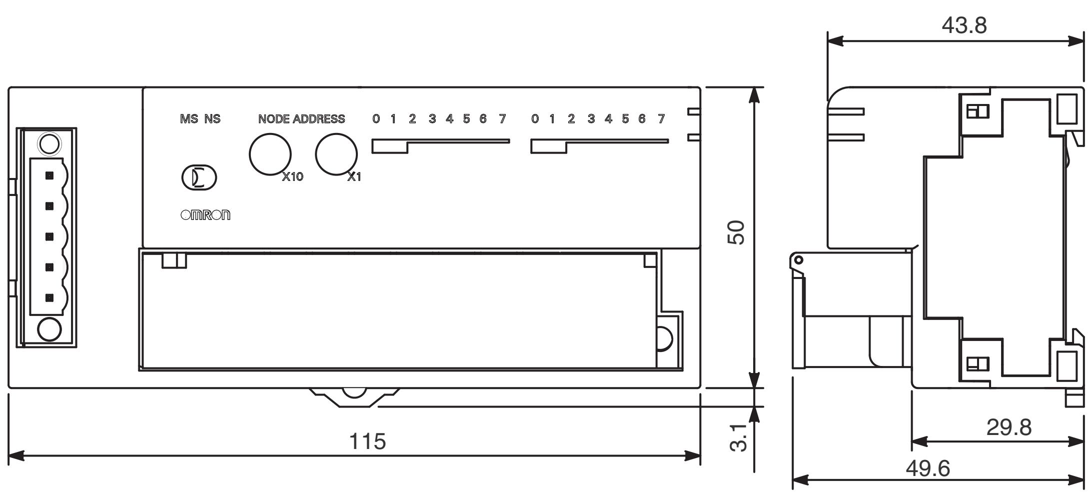
**DRT2-MD16-1 (PNP)**




**Note** 1. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

2. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-MD16 and DRT2-MD16-1




# 5-5-8 Remote I/O Terminal with 16 Relay Outputs: DRT2-ROS16

## Common Specifications

| Item | Specifications |
|---|---|
| Communications power supply voltage | 11 to 25 V DC<br>(Supplied from the communications connector.) |
| Noise immunity | Conforms to IEC61000-4-4. 2 kV (power lines) |
| Vibration resistance | 10 to 55 Hz, 0.7-mm double amplitude |
| Shock resistance | 100 m/s$^2$ |

| Item | Specifications |
|---|---|
| Dielectric strength | 500 V AC (between isolated circuits) |
| Insulation resistance | 20 MΩ min. at 250 V DC |
| Ambient temperature | –10 to +55°C |
| Ambient humidity | 25% to 85% (with no condensation) |
| Operating environment | No corrosive gases |
| Storage temperature | –25 to +65°C |
| Mounting | 35-mm DIN Track mounting |
| Screw tightening torque | M2 (communications connector lock screws): 0.26 to 0.3 N·m<br>M3 wiring screws: 0.5 N·m<br>M3 mounting screws: 0.5 N·m |

## Output Specifications (for One Relay)

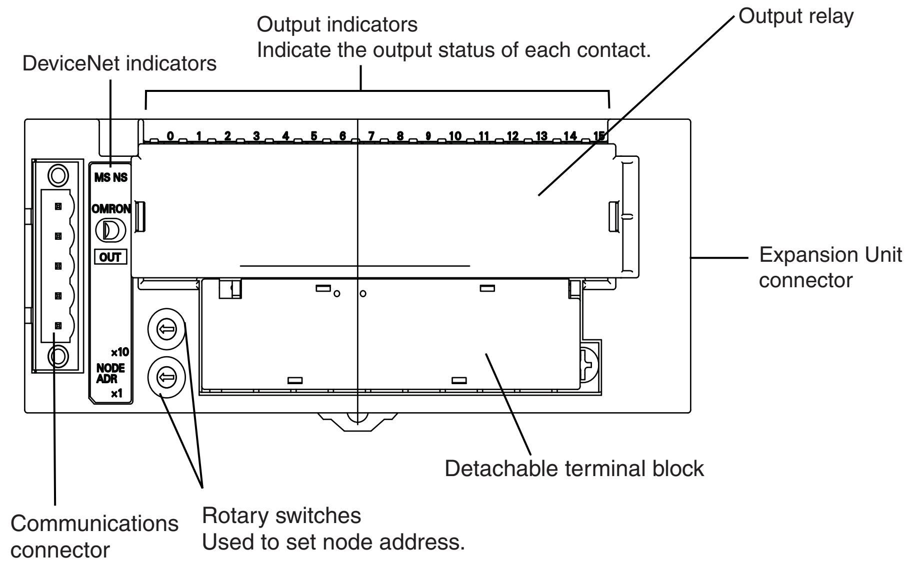
| Item | Specifications |
|---|---|
| Relay | DRTA-NY5W-K |
| Rated load | Resistive load<br>250 V AC, 2 A, 8-A common<br>30 V DC, 2 A, 8-A common |
| Rated carry current | 3 A (See note.) |
| Maximum switching voltage | 250 V AC, 125 V DC |
| Maximum switching current | 3 A |
| Maximum switching capacity | 750 V AC, 90 V DC |
| Minimum applicable load (reference value) | 5 V DC at 1 mA |

**Note** The rated carry current can be as high as 3 A (10-A common) if the number of terminals that turn ON simultaneously is four or less per common, or if the ambient temperature is 45°C or lower.

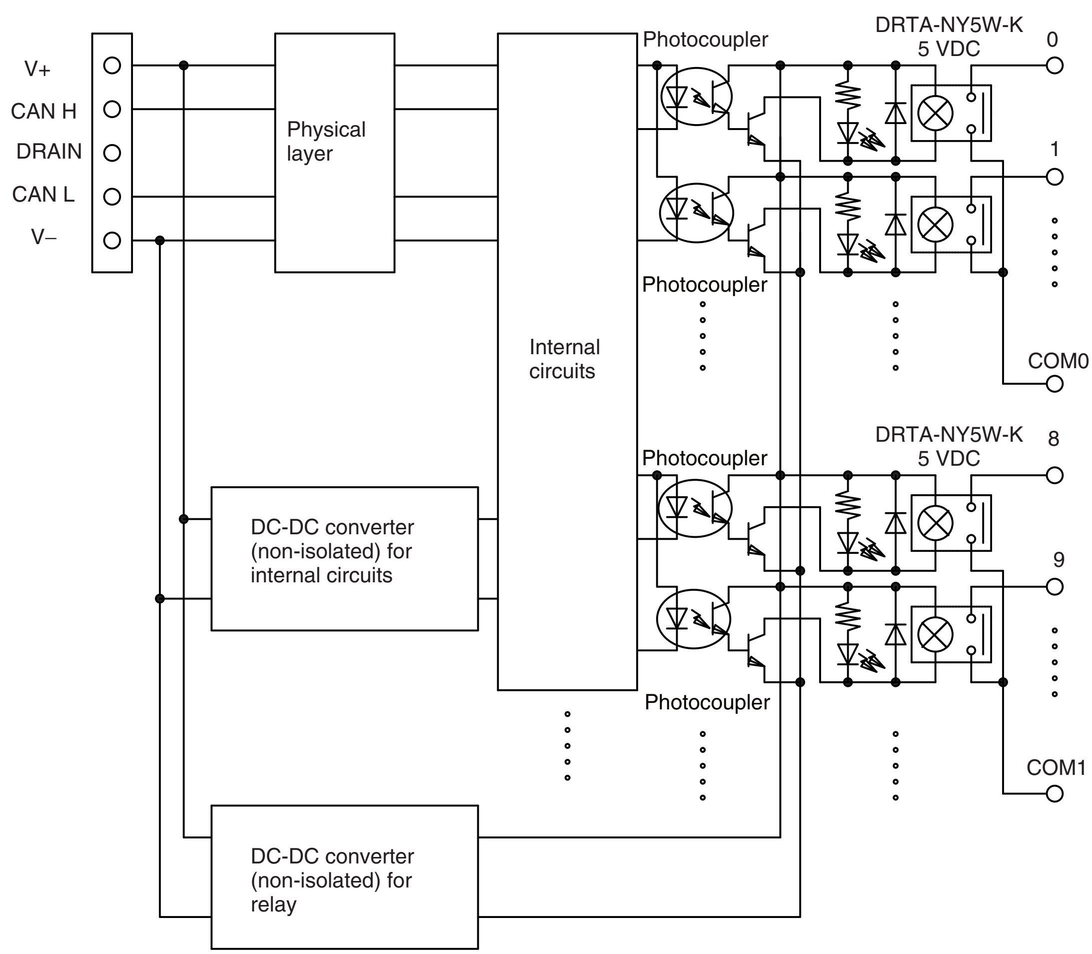
### Relay Life Expectancy

| Item | Specifications |
|---|---|
| Mechanical life expectancy | 20,000,000 times min. |
| Electrical life expectancy | 100,000 times min. |

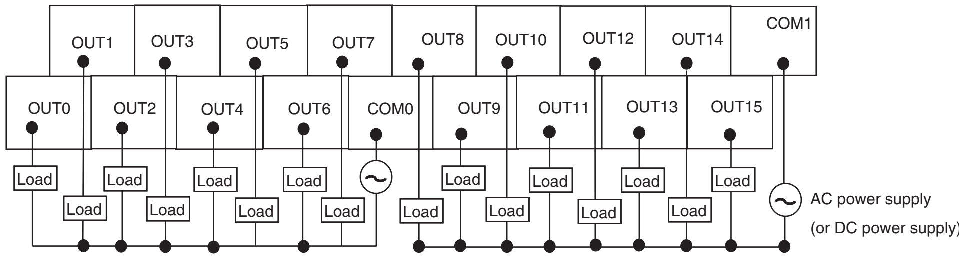
## Component Names and Functions



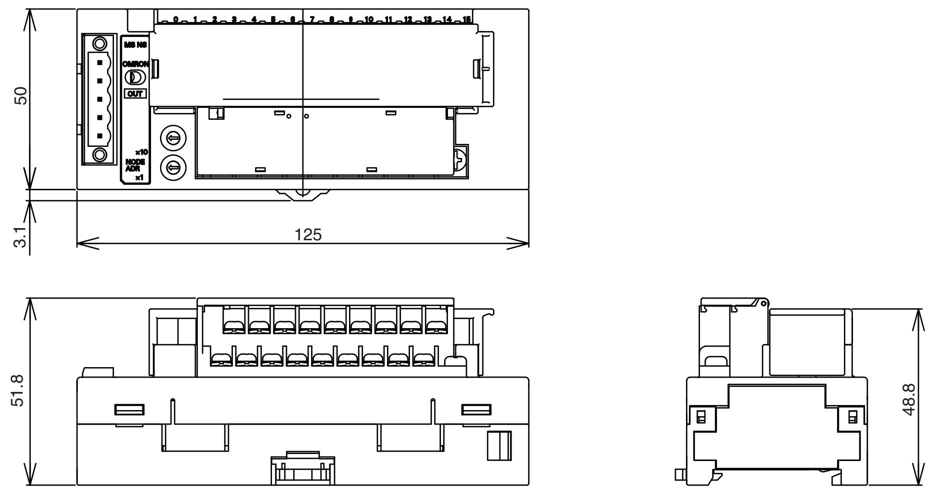

## Internal Circuits



## Wiring

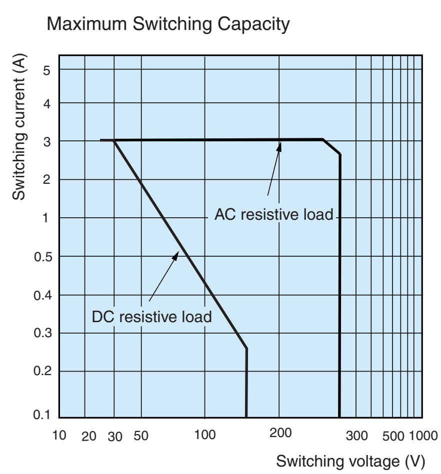


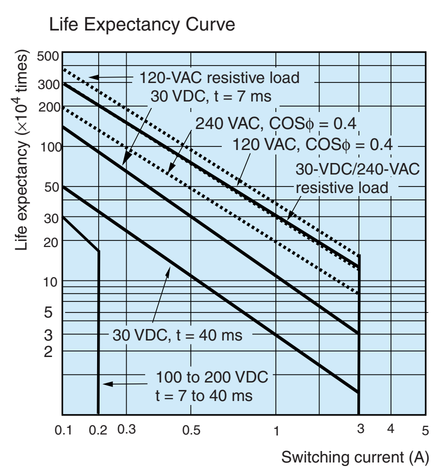

## Dimensions




**Reference Data**

The data shown below is based on actual measurements of samples taken from the production line. There is some degree of variation in relay characteristics and so this data should be used only for reference purposes.




## ⚠ Caution

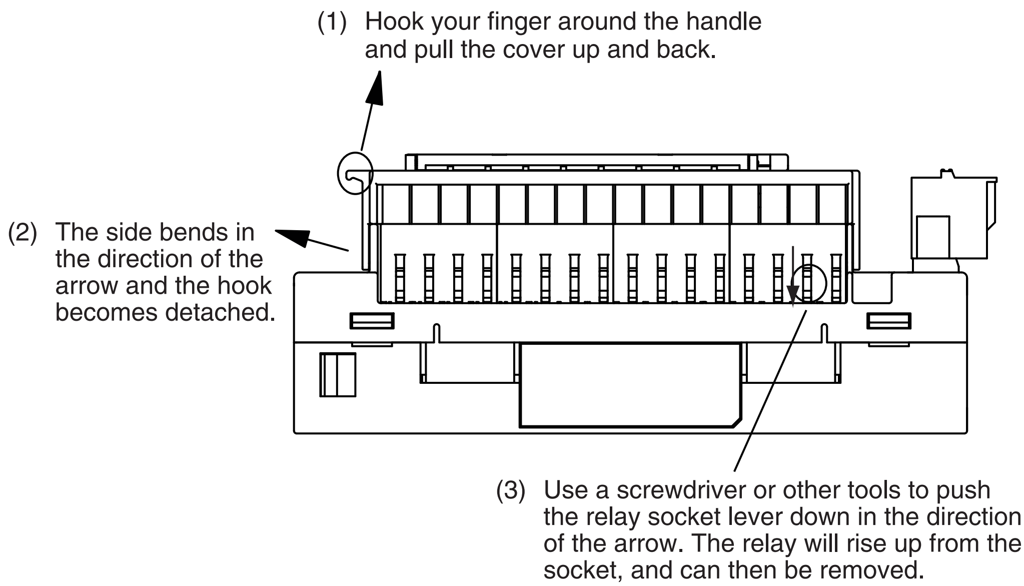
Do not install the Unit that has relay outputs on the locations that always subject to vibration. It may cause a failure or malfunction.

**Note**

1. With a current of between 2 and 3 A (common: 8 to 10 A), either ensure that the number of points per common that simultaneously turn ON does not exceed 4 or ensure that the temperature does not exceed 45°C. There are no restrictions if the current does not exceed 2 A (common: 8 A).
2. Using at the rated current value assures normal Unit operation but does not assure the life expectancy of the relay itself. The relay's life expectancy varies greatly with the operating temperature, type of load, and switching conditions, and so be sure to check the relay characteristics under the actual operating conditions.

**Relay Replacement Method**

When replacing output relays, remove the cover as shown below.

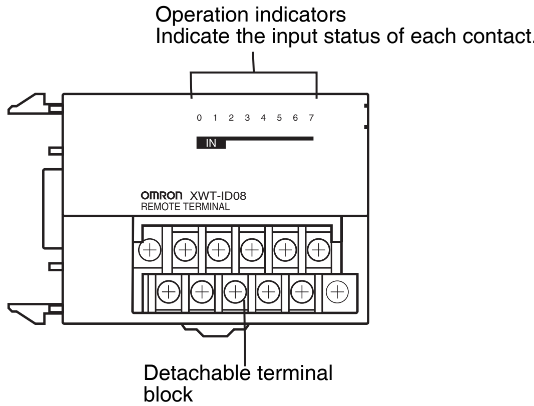



## 5-5-9 Remote I/O Terminal Expansion Units with 8 Transistor Inputs: XWT-ID08 (NPN) and XWT-ID08-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | XWT-ID08 | XWT-ID08-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min.<br>(between each input terminal and V) | 15 V DC min.<br>(between each input terminal and G) |
| OFF voltage | 5 V DC max.<br>(between each input terminal and V) | 5 V DC max.<br>(between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC)<br>3.0 mA min./point (for 17 V DC) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## Component Names and Functions: XWT-ID08 and XWT-ID08-1



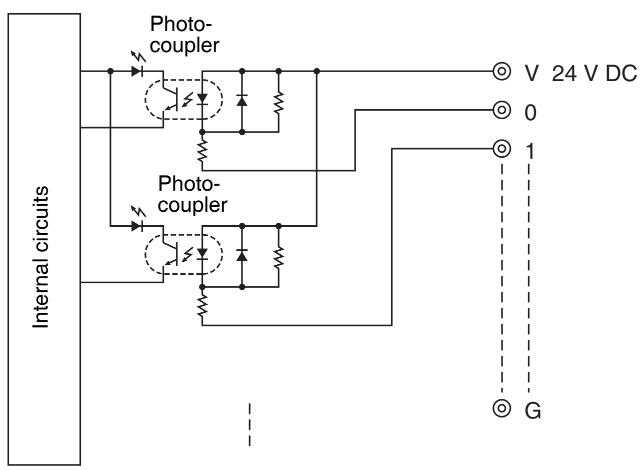

## Operation Indicators

The operation indicators show the status of the inputs.

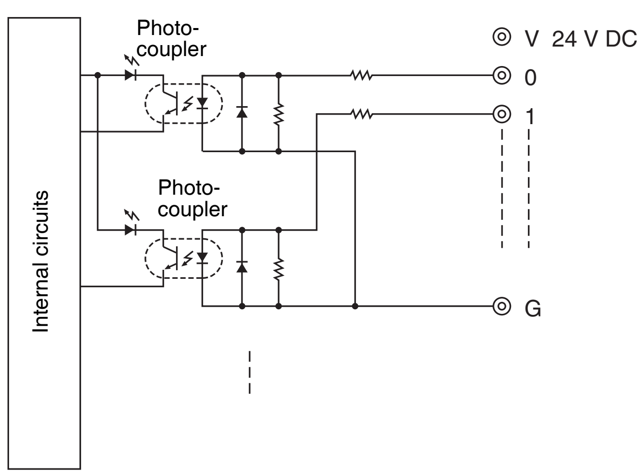
| Indicator name | Indicator status | Definition | Meaning |
|---|---|---|---|
| 0 to 7 | Lit yellow. | Contacts ON | Contacts are ON |
| | OFF | Contacts OFF | Contacts are OFF |

## Internal Circuits

**XWT-ID08 (NPN)**

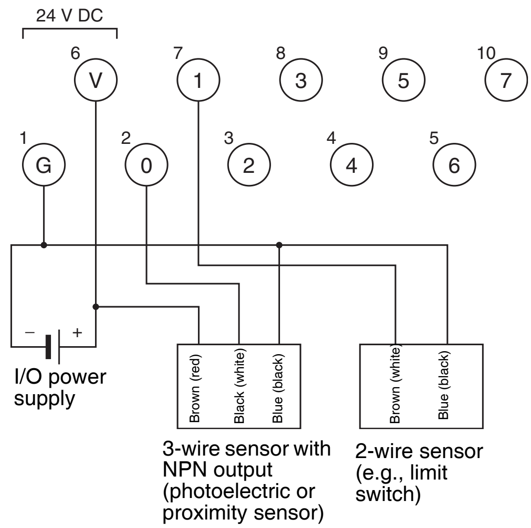



**XWT-ID08-1 (PNP)**

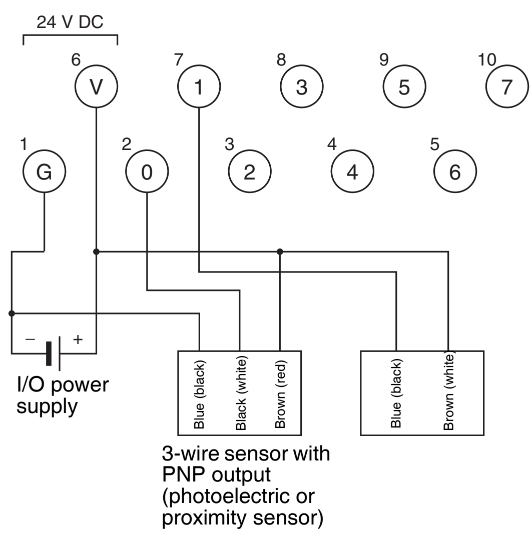


## Wiring

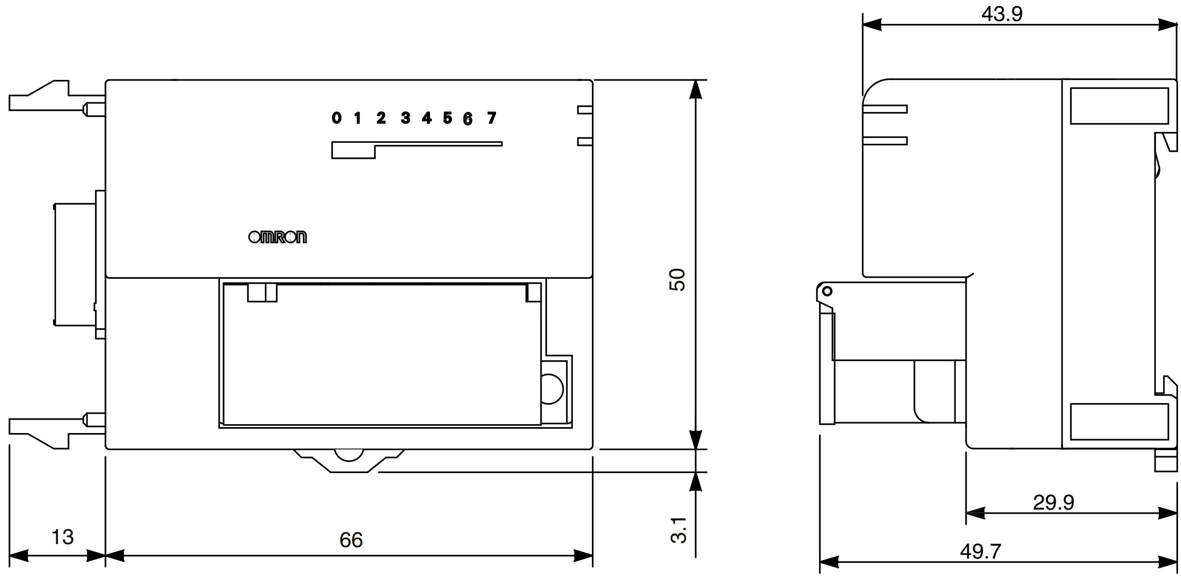
### XWT-ID08 (NPN)




### XWT-ID08-1 (PNP)



## Dimensions: XWT-ID08 and XWT-ID08-1

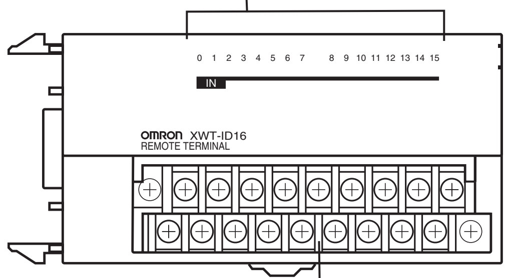



## 5-5-10 Remote I/O Terminal Expansion Units 16 Transistor Inputs: XWT-ID16 (NPN) and XWT-ID16-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | XWT-ID16 | XWT-ID16-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 15 V DC min.<br>(between each input terminal and V) | 15 V DC min.<br>(between each input terminal and G) |
| OFF voltage | 5 V DC max.<br>(between each input terminal and V) | 5 V DC max.<br>(between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC)<br>3.0 mA min./point (for 17 V DC) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Component Names and Functions: XWT-ID16 and XWT-ID16-1



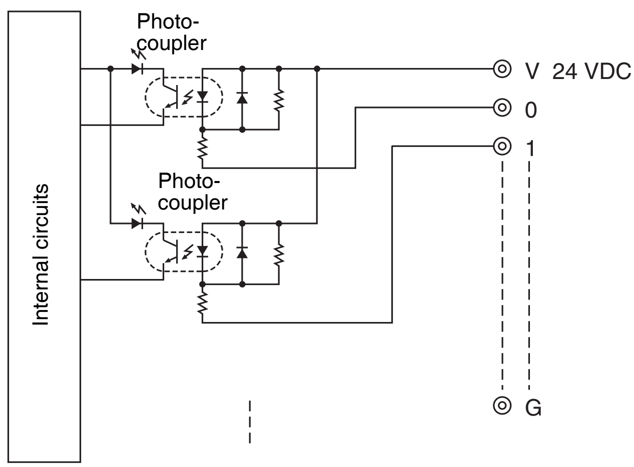

## Operation Indicators

The operation indicators show the status of the inputs.

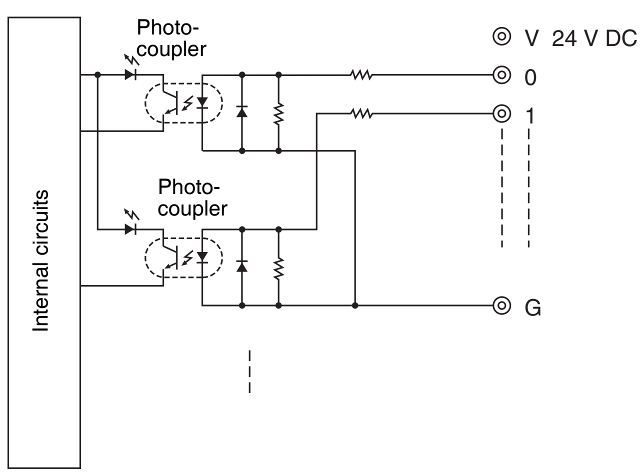
| Indicator name | Indicator status | Definition | Meaning |
|---|---|---|---|
| 0 to 15 | Lit yellow. | Contacts ON | Contacts are ON |
| | OFF | Contacts OFF | Contacts are OFF |

## Internal Circuits

**XWT-ID16 (NPN)**

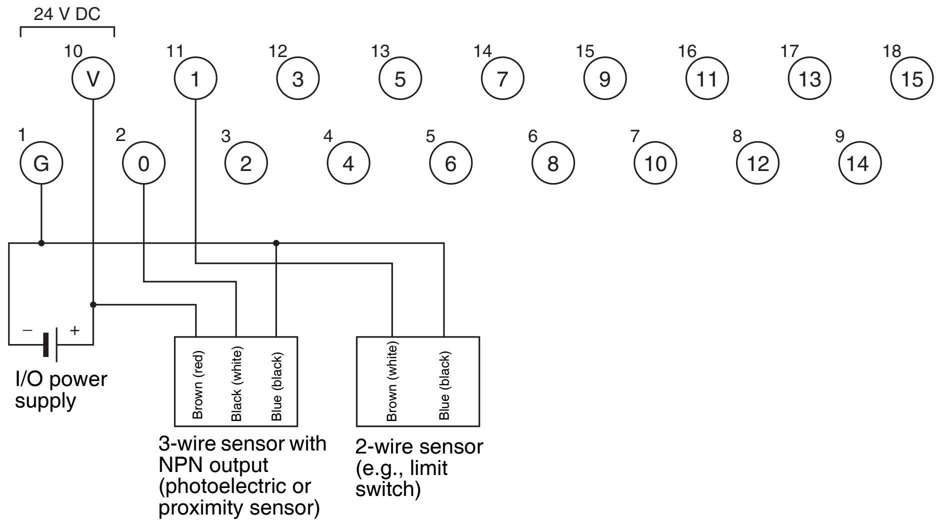



**XWT-ID16-1 (PNP)**

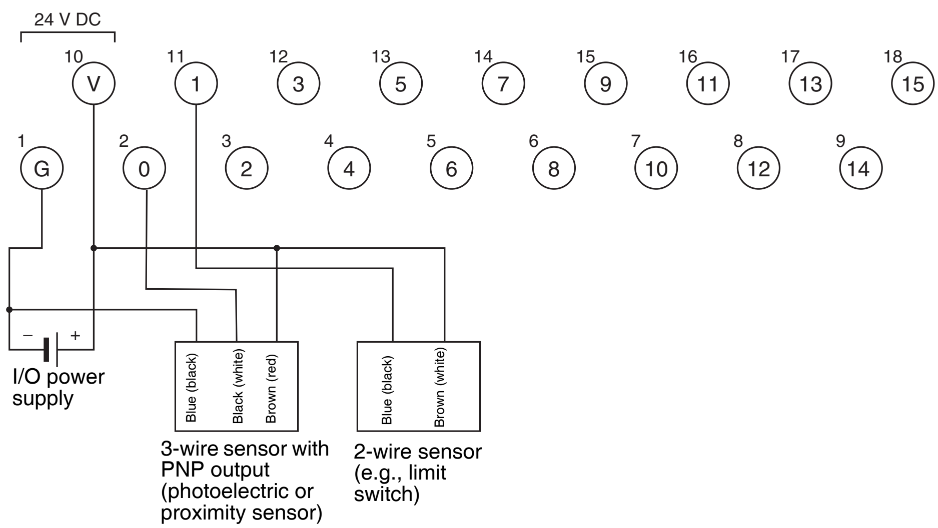


## Wiring

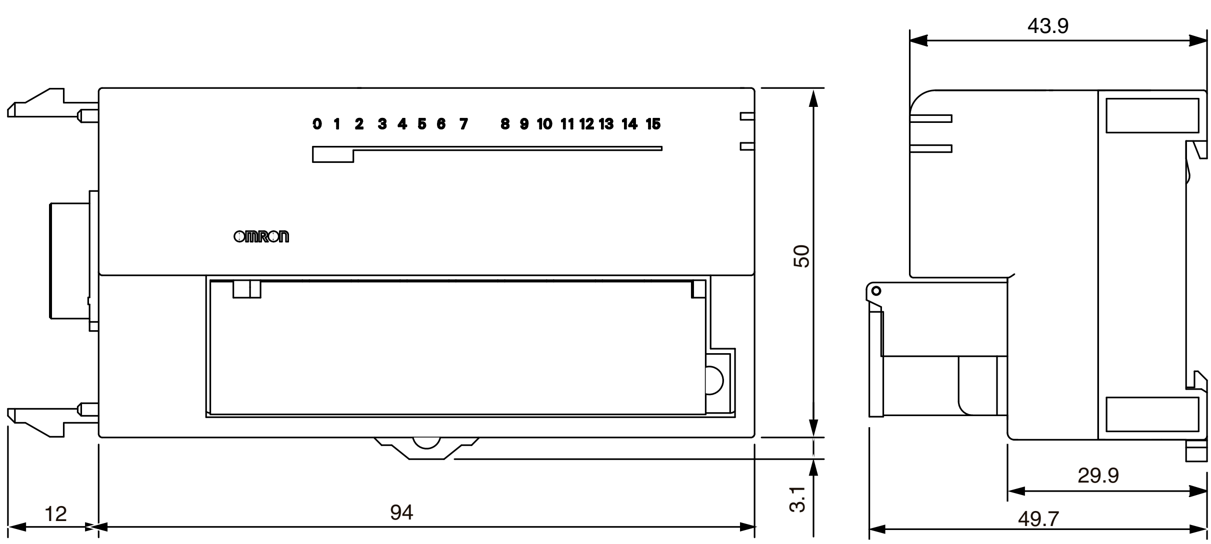
### XWT-ID16 (NPN)




### XWT-ID16-1 (PNP)




## Dimensions: XWT-ID16 and XWT-ID16-1

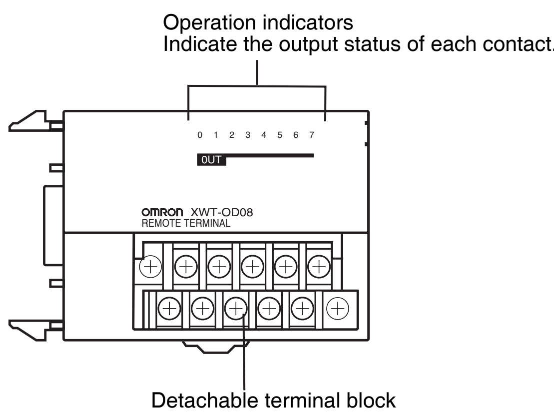


## 5-5-11 Remote I/O Terminal Expansion Units with 8 Transistor Outputs: XWT-OD08 (NPN) and XWT-OD08-1 (PNP)

### Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | XWT-OD08 | XWT-OD08-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 0.5 A/point, 2.0 A/common | |
| Residual voltage | 1.2 V max.<br>(at 0.5 A between each output terminal and G) | 1.2 V max.<br>(at 0.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Component Names and Functions: XWT-OD08 and XWT-OD08-1



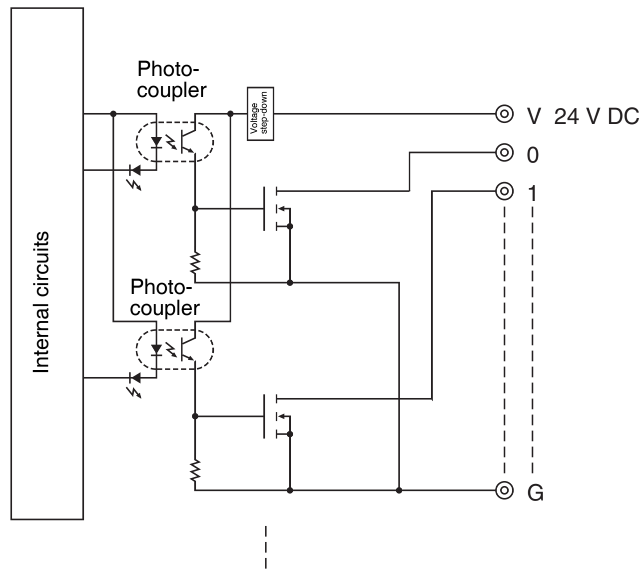

### Operation Indicators

The operation indicators show the status of the outputs.

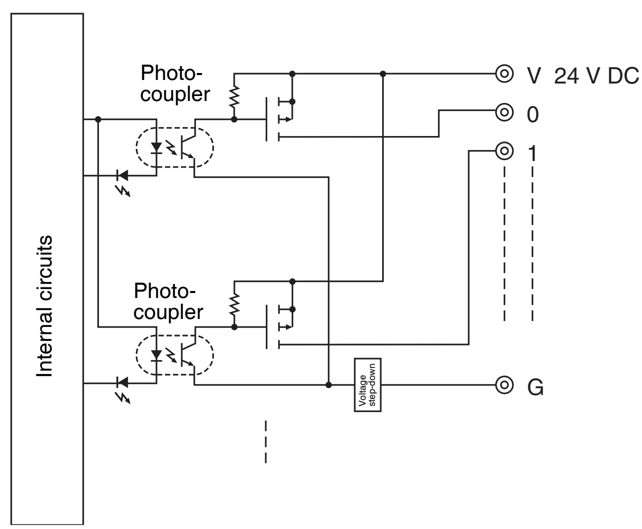
| Indicator name | Indicator status | Definition | Meaning |
|---|---|---|---|
| 0 to 7 | Lit yellow. | Contacts ON | Contacts are ON |
| | OFF | Contacts OFF | Contacts are OFF |

## Internal Circuits

### XWT-OD08 (NPN)

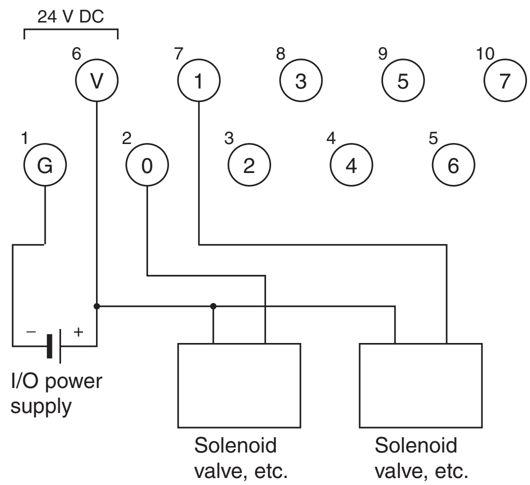



### XWT-OD08-1 (PNP)

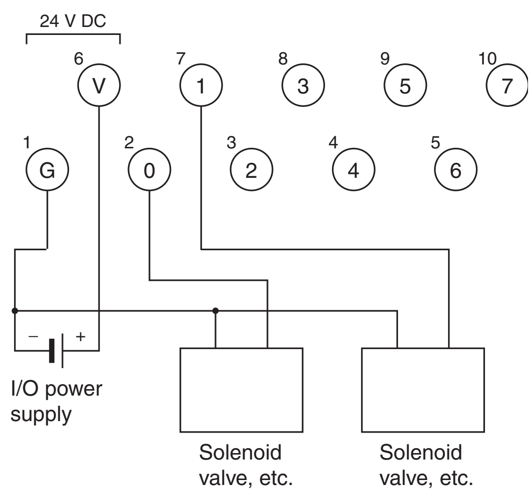


## Wiring

**XWT-OD08 (NPN)**

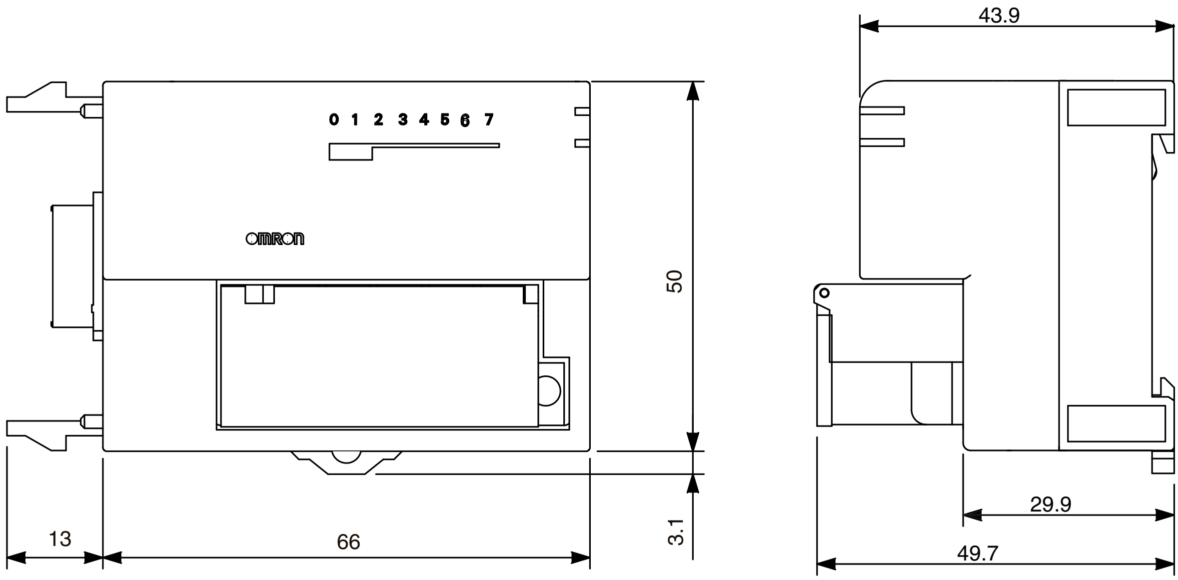



**XWT-OD08-1 (PNP)**




**Note** When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: XWT-OD08 and XWT-OD08-1

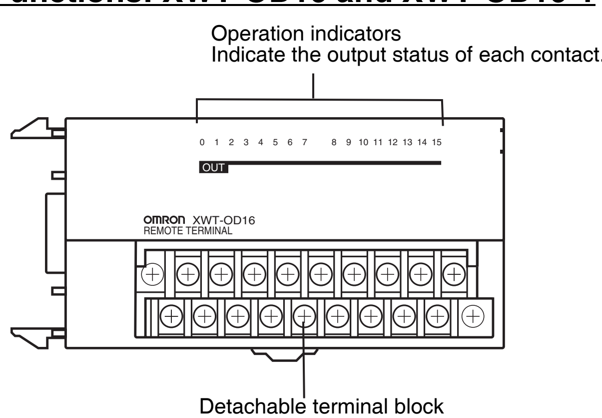



# 5-5-12 Remote I/O Terminal Expansion Units with 16 Transistor Outputs: XWT-OD16 (NPN) and XWT-OD16-1 (PNP)

## Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | XWT-OD16 | XWT-OD16-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.5 A/point, 4.0 A/common | |
| Residual voltage | 1.2 V max.<br>(at 0.5 A between each output terminal and G) | 1.2 V max.<br>(at 0.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Component Names and Functions: XWT-OD16 and XWT-OD16-1



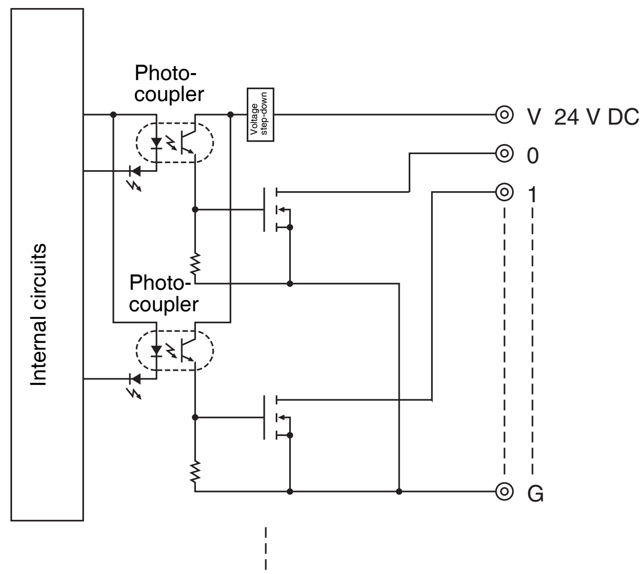
## Operation Indicators

The operation indicators show the status of the outputs.

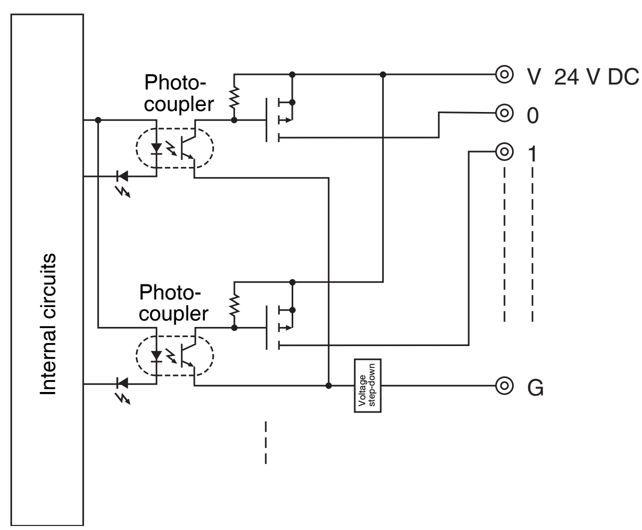
| Indicator name | Indicator status | Definition | Meaning |
|---|---|---|---|
| 0 to 15 | Lit yellow. | Contacts ON | Contacts are ON |
| | OFF | Contacts OFF | Contacts are OFF |

## Internal Circuits

**XWT-OD16 (NPN)**

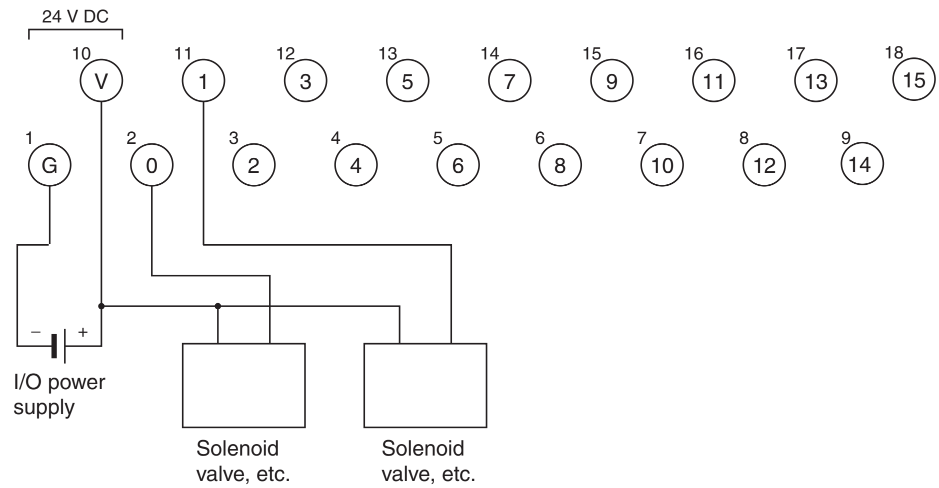



**XWT-OD16-1 (PNP)**

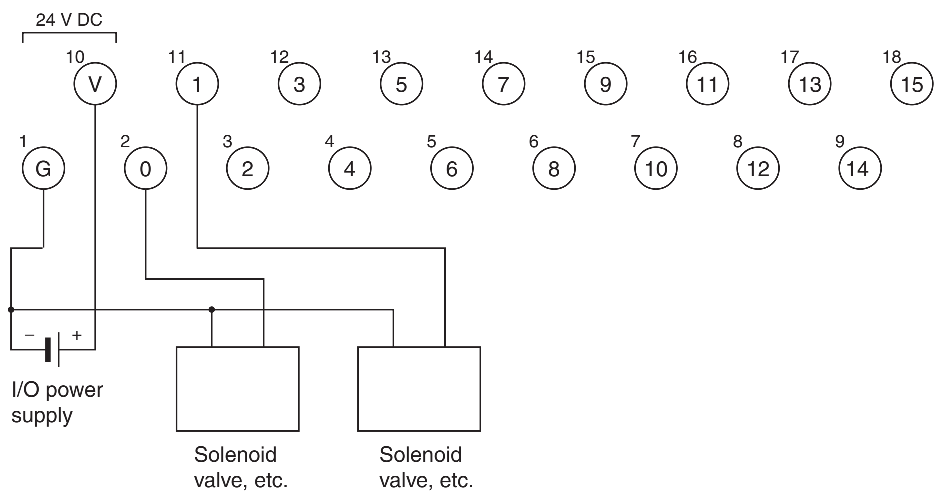


## Wiring

### XWT-OD16 (NPN)

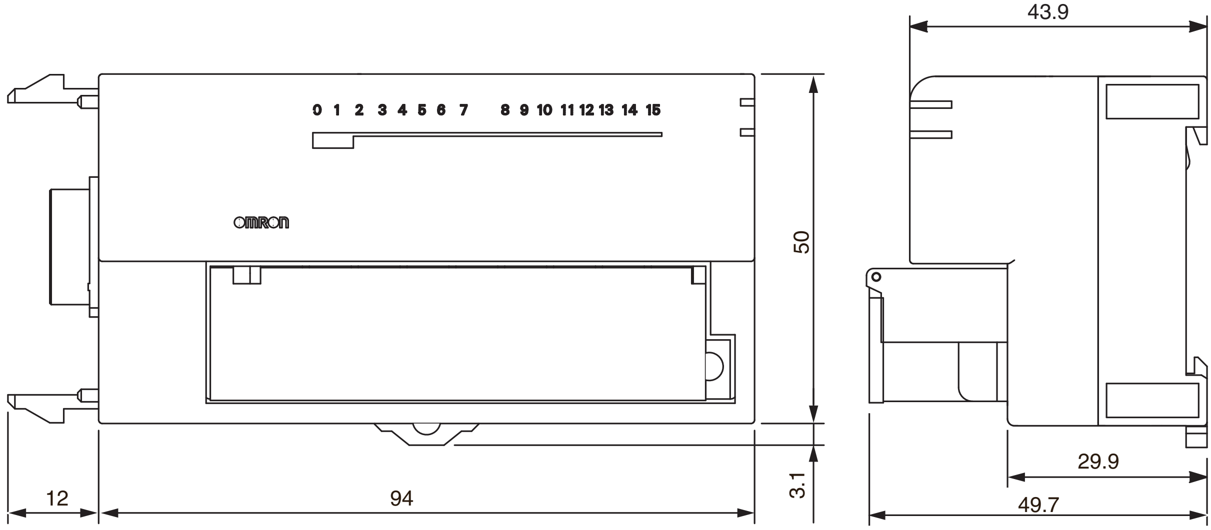



### XWT-OD16-1 (PNP)




**Note** When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: XWT-OD16 and XWT-OD16-1

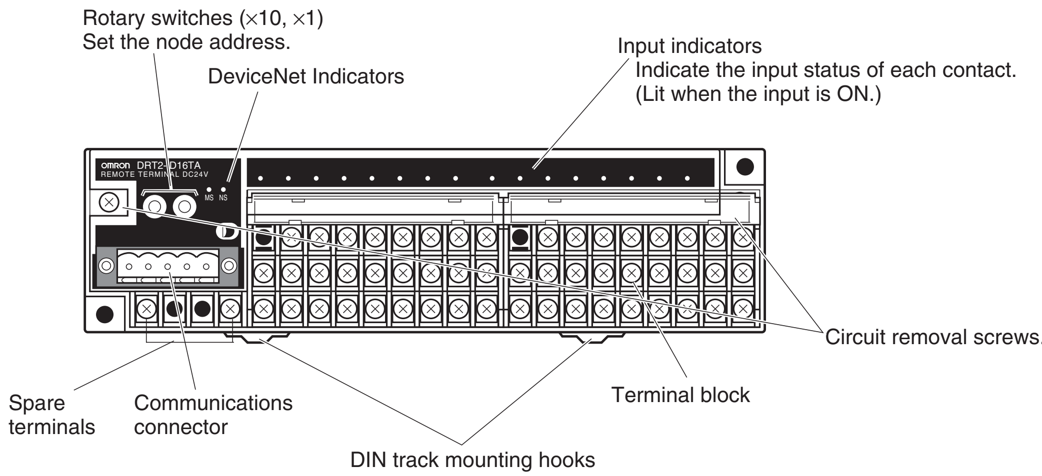



# 5-5-13 Transistor Remote Input Terminals with 16 Points and 3-tier I/O Terminal Blocks: DRT2-ID16TA (NPN) and DRT2-ID16TA-1 (PNP)

## Input Specifications

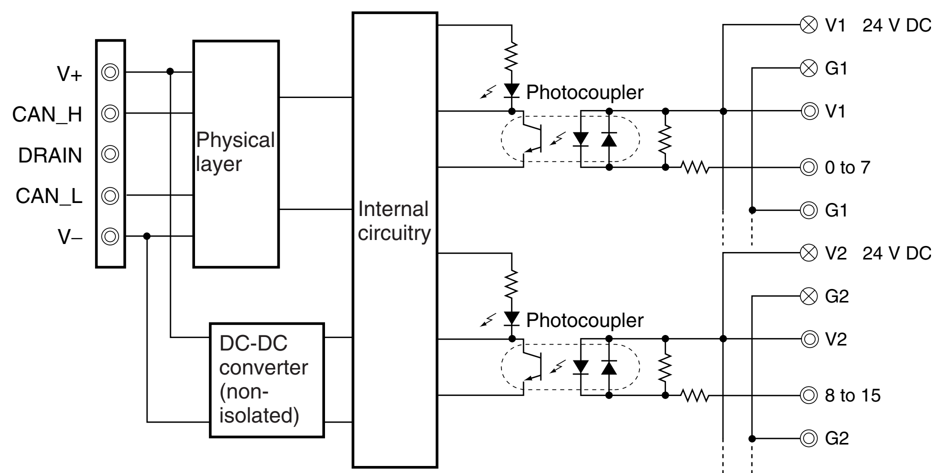
| Item | Specification | |
|---|---|---|
| Model | DRT2-ID16TA | DRT2-ID16TA-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max./point at 24 V DC<br>3.0 mA min./point at 17 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with two commons | |
| Current supplied to input devices | 100 mA/input | |

## Components of the DRT2-ID16TA and DRT2-ID16TA-1

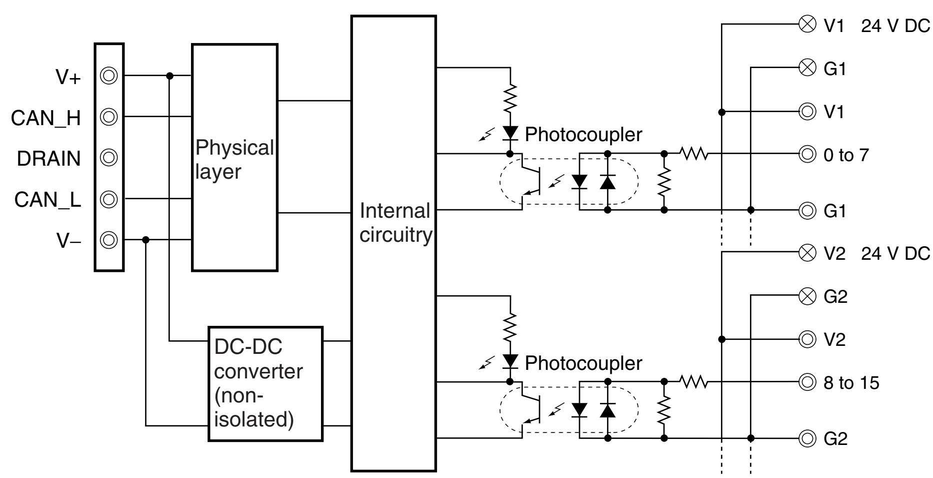



## Internal Circuits

### DRT2-ID16TA (NPN)

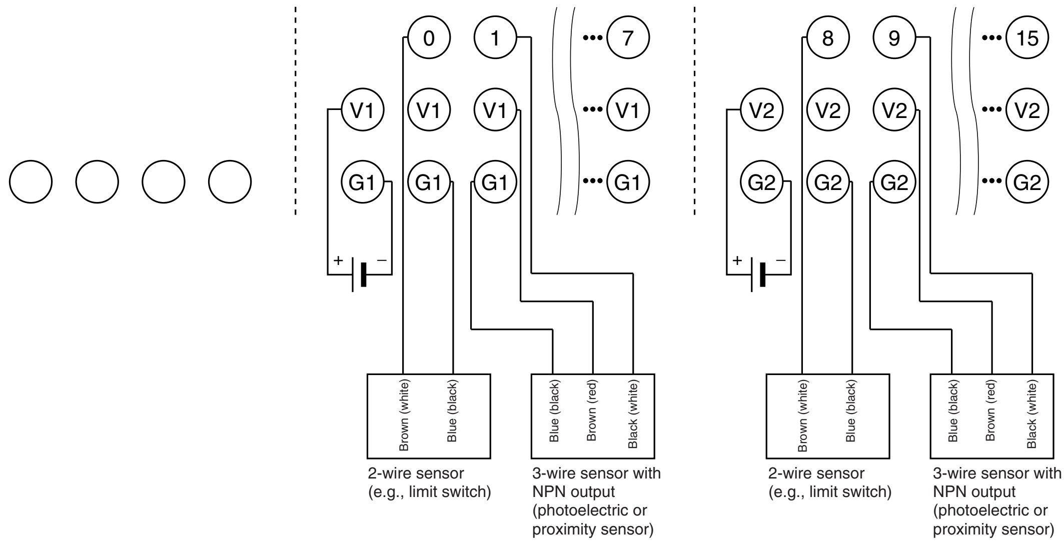



### DRT2-ID16TA-1 (PNP)

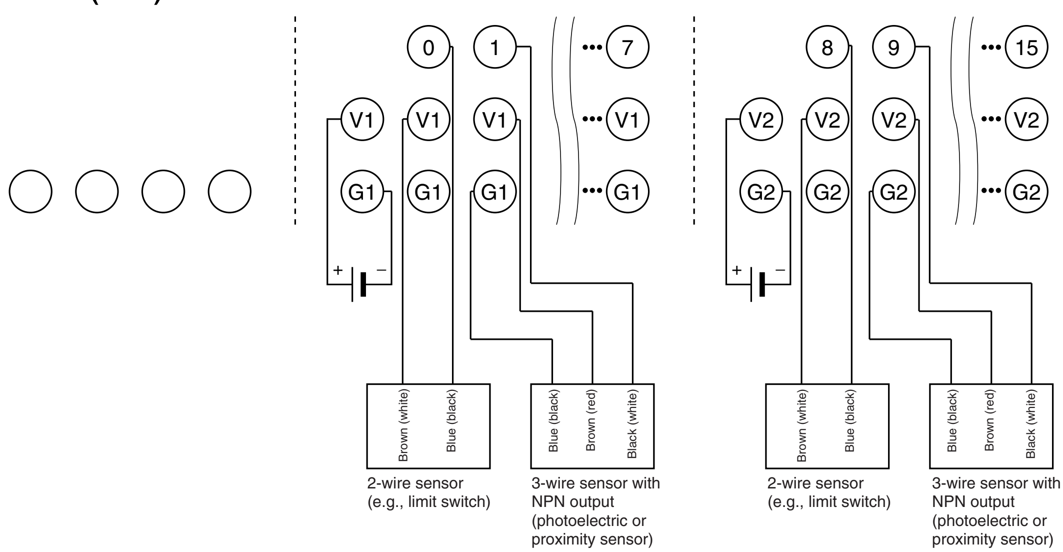


## Wiring

**DRT2-ID16TA (NPN)**



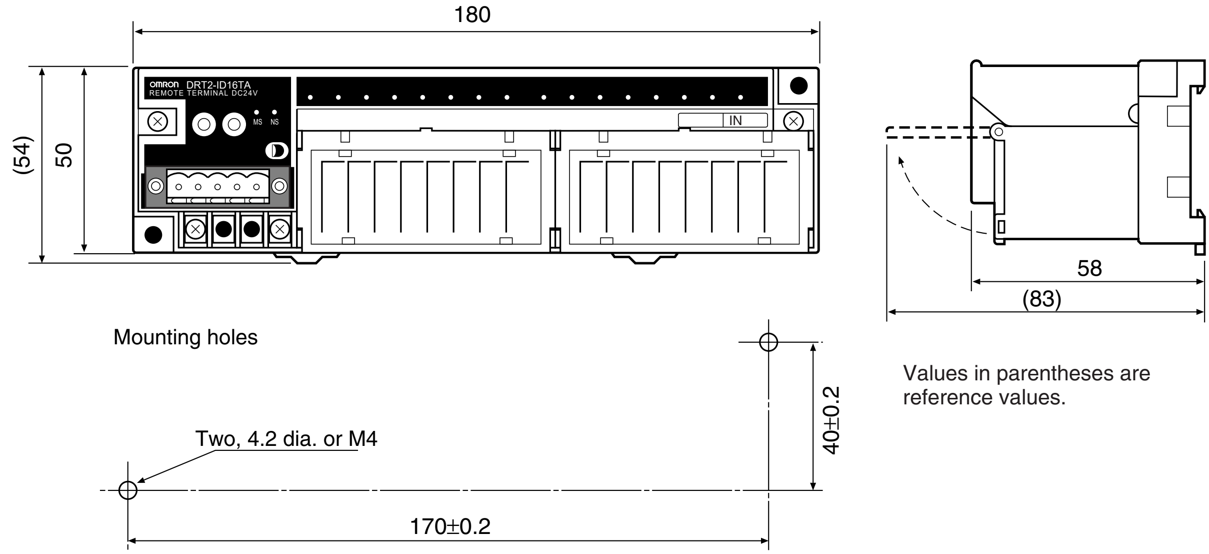

**DRT2-ID16TA-1 (PNP)**



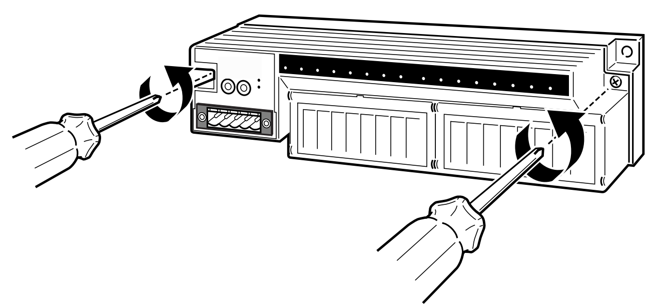

**Note**

1. V1 is not connected internally to V2, and G1 is not connected internally to G2. Connect them carefully.
   Do not connect anything to the reserved terminals.
2. Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

## Dimensions: DRT2-ID16TA and DRT2-ID16TA-1




**Note** The circuit section can be removed by loosening the circuit removal screws. (Refer to *Components of the DRT2-ID16TA and DRT2-ID16TA-1.*)
Always turn OFF the communications, internal, and I/O power supplies before removing or attaching the circuit section.

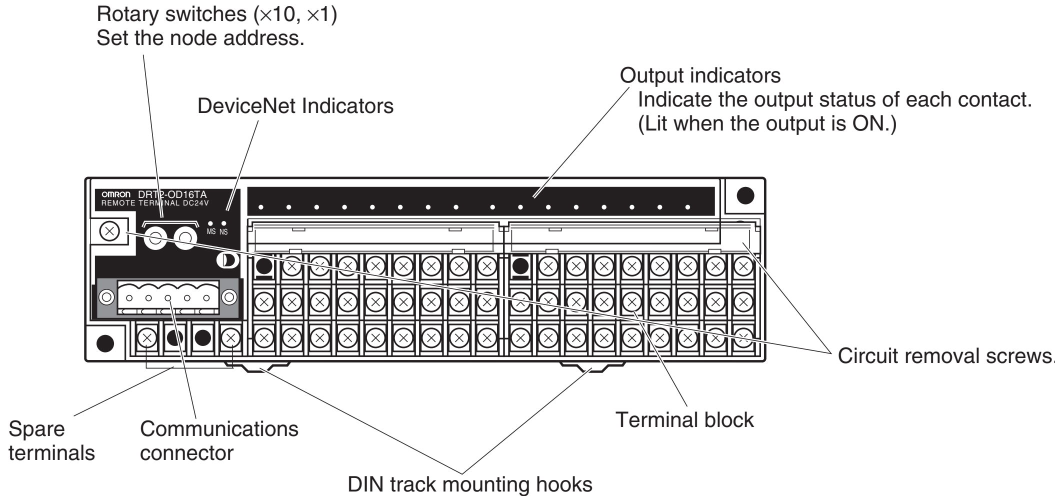


## 5-5-14 Transistor Remote Output Terminals with 16 Points and 3-tier I/O Terminal Blocks: DRT2-OD16TA (NPN) and DRT2-OD16TA-1 (PNP)

### Output Specifications

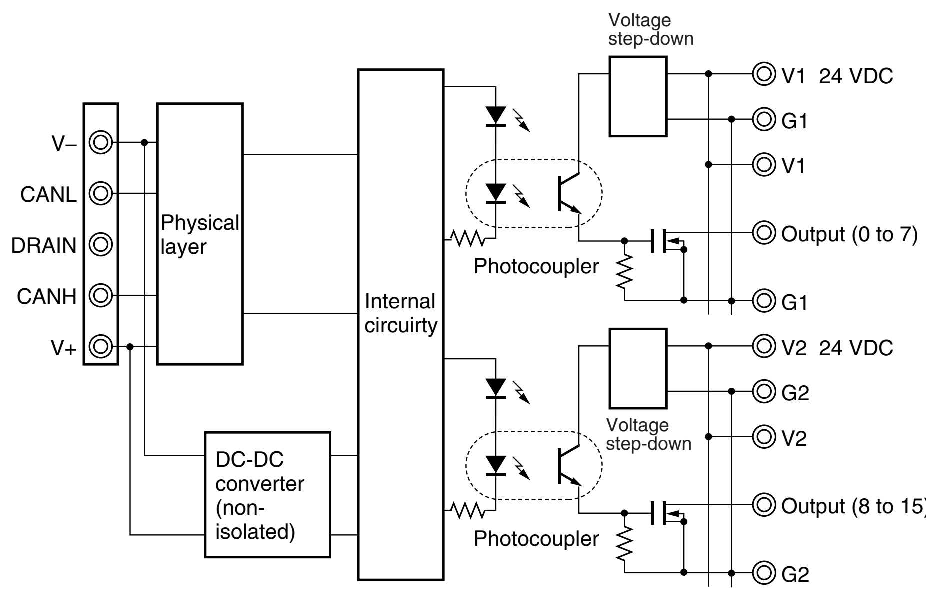
| Item | Specification | |
|---|---|---|
| Model | DRT2-OD16TA | DRT2-OD16TA-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.5 A/point | |
| Residual voltage | 1.2 V max. (at 0.5 A, between each output terminal and G) | 1.2 V max. (at 0.5 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points | |
| Current supplied to output devices | 100 mA/output | |

## Components of the DRT2-OD16TA and DRT2-OD16TA-1

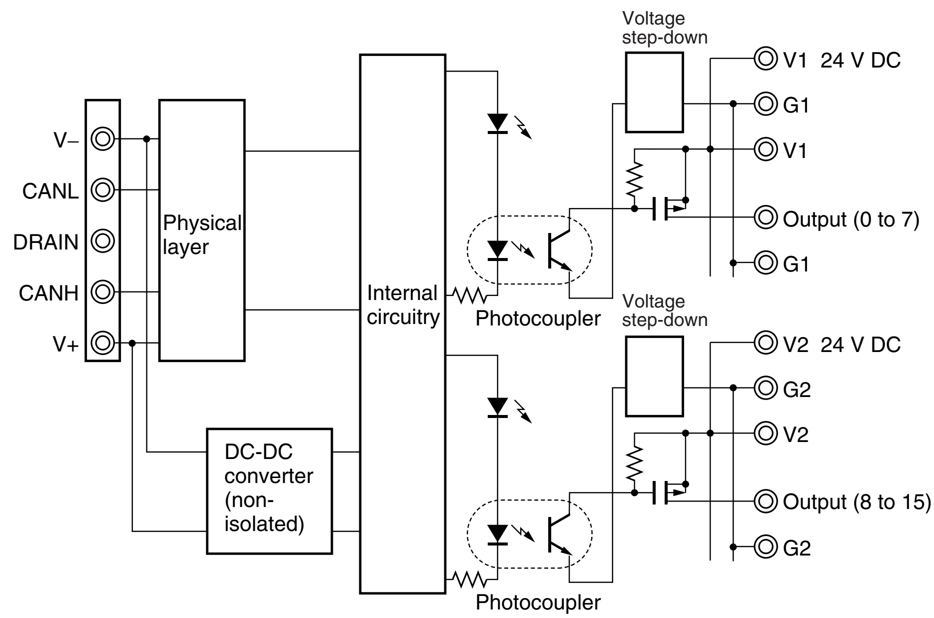



## Internal Circuits

### DRT2-OD16TA (NPN)

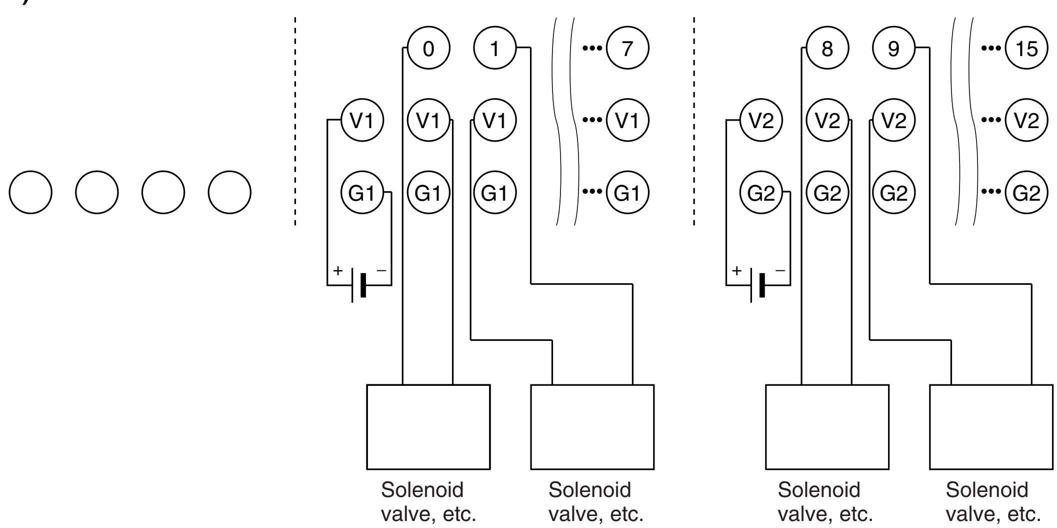


**DRT2-OD16TA-1 (PNP)**

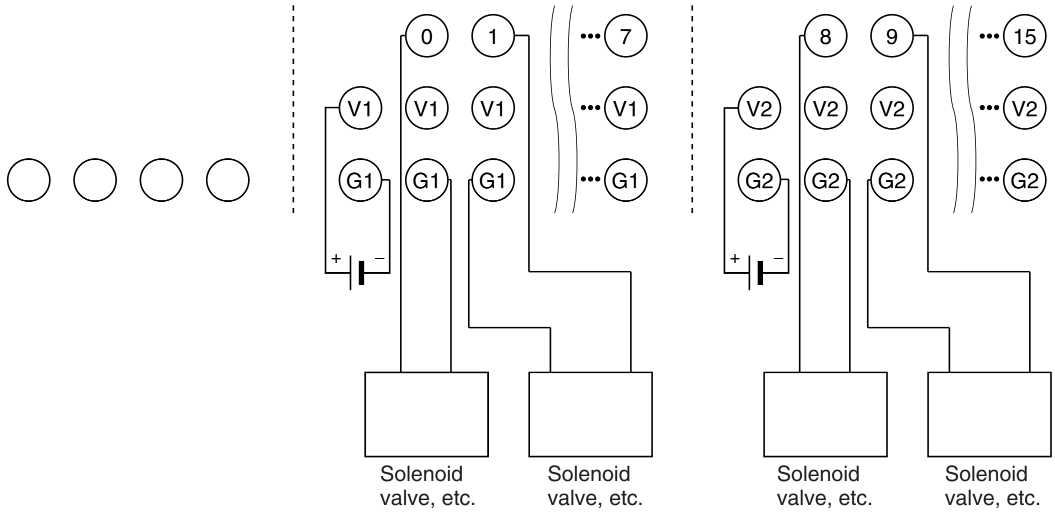



## Wiring

**DRT2-OD16TA (NPN)**

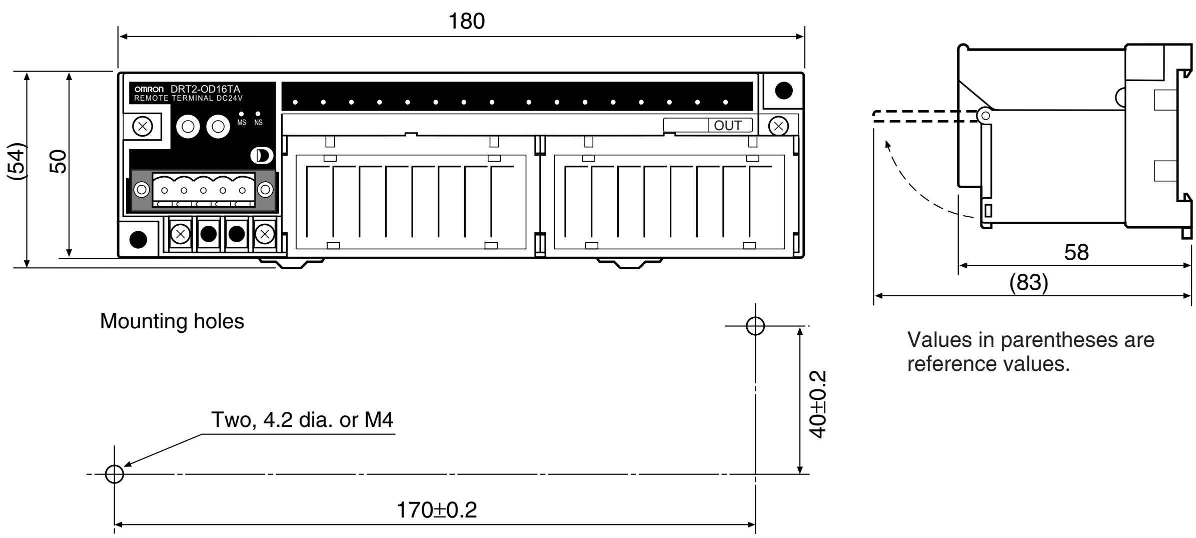


**DRT2-OD16TA-1 (PNP)**



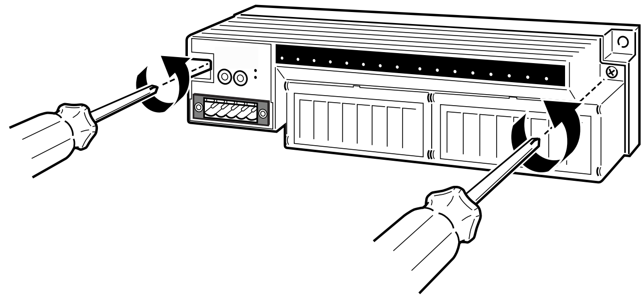

**Note**
1. V1 is not connected internally to V2, and G1 is not connected internally to G2. Connect them carefully.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Do not connect anything to the reserved terminals.

## Dimensions: DRT2-OD16TA and DRT2-OD16TA-1




**Note** The circuit section can be removed by loosening the circuit removal screws. (Refer to *Components of the DRT2-OD16TA and DRT2-OD16TA-1.*)

Always turn OFF the communications, internal, and I/O power supplies before removing or attaching the circuit section.



## 5-5-15 Transistor Remote I/O Terminals with 8 Inputs and 8 Outputs and 3-tier I/O Terminal Blocks: DRT2-MD16TA (NPN) and DRT2-MD16TA-1 (PNP)

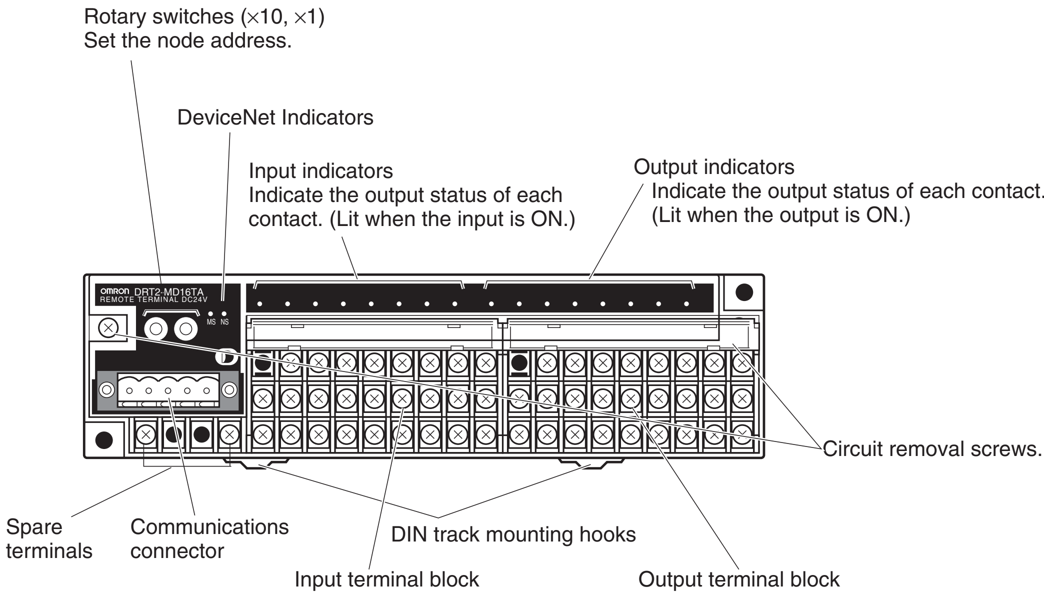
### Input Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-MD16TA | DRT2-MD16TA-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max./point at 24 V DC<br>3.0 mA min./point at 17 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |
| Current supplied to input devices | 100 mA/input | |

### Output Specifications

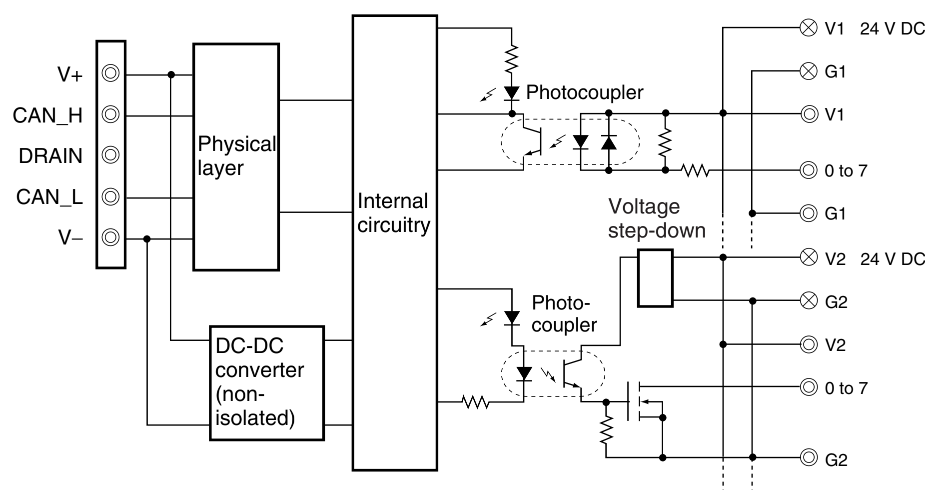
| Item | Specification | |
|---|---|---|
| Model | DRT2-MD16TA | DRT2-MD16TA-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 0.5 A/point | |
| Residual voltage | 1.2 V max. (at 0.5 A, between each output terminal and G) | 1.2 V max. (at 0.5 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |
| Current supplied to output devices | 100 mA/output | |

## Components of the DRT2-MD16TA and DRT2-MD16TA-1

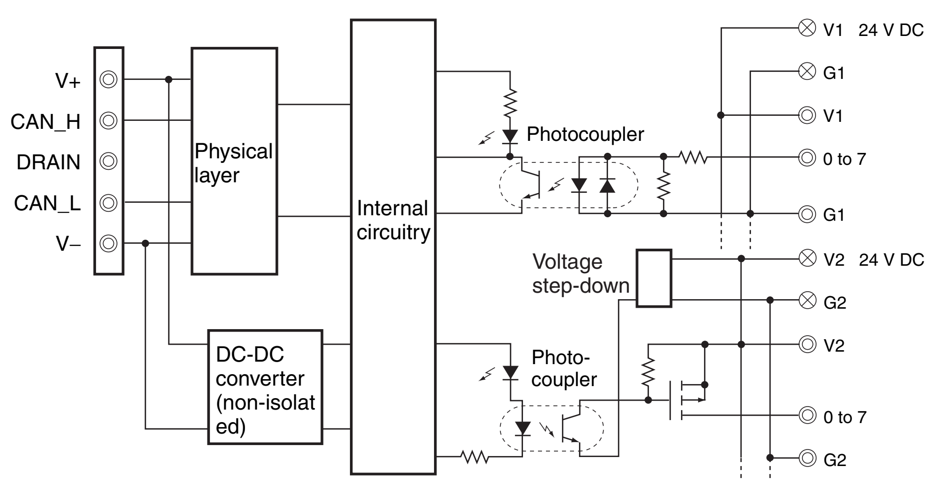



## Internal Circuits

### DRT2-MD16TA (NPN)

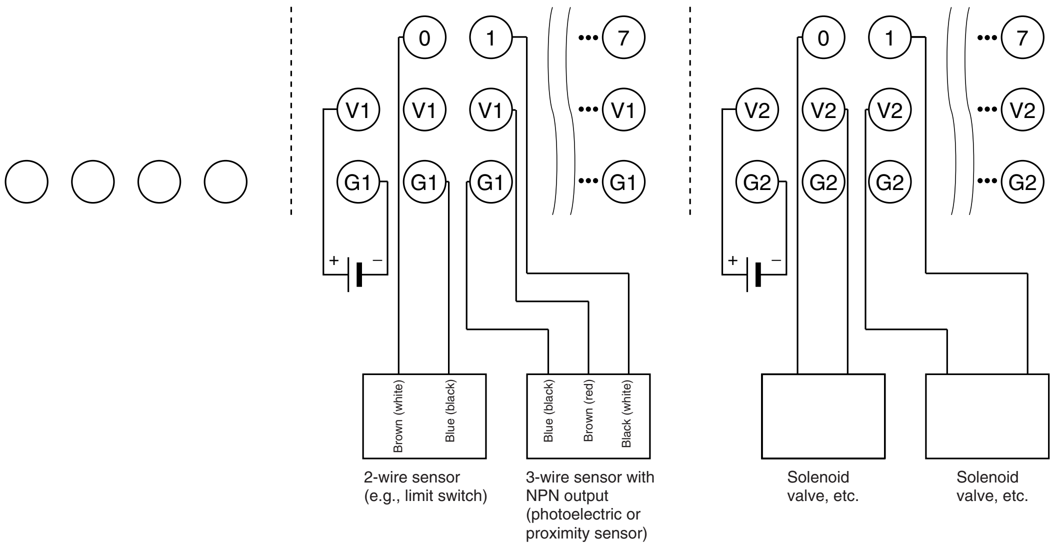



### DRT2-MD16TA-1 (PNP)

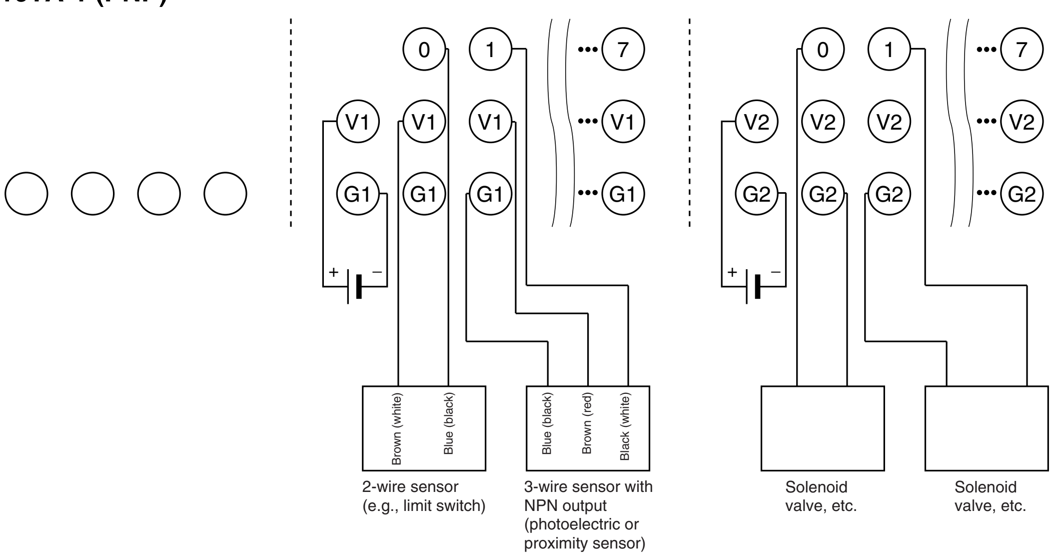


## Wiring

**DRT2-MD16TA (NPN)**



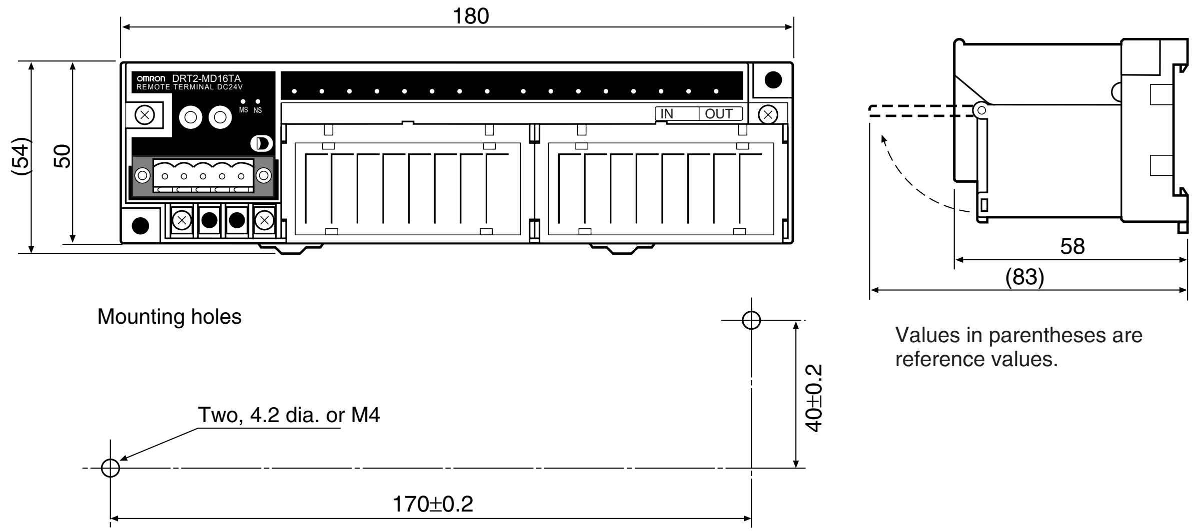

**DRT2-MD16TA-1 (PNP)**



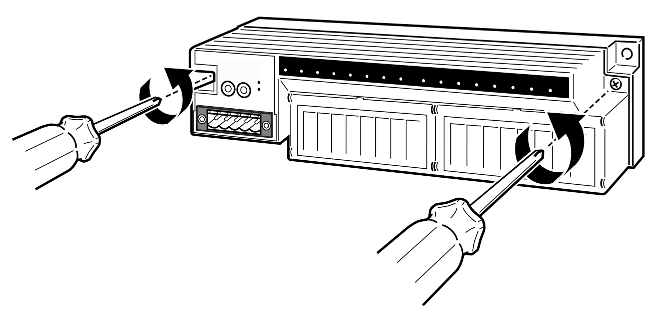

**Note**

1. V1 is not connected internally to V2, and G1 is not connected internally to G2. Connect them carefully
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Do not connect anything to the reserved terminals.
4. Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

## Dimensions: DRT2-MD16TA and DRT2-MD16TA-1




**Note** The circuit section can be removed by loosening the circuit removal screws. (Refer to *Components of the DRT2-MD16TA and DRT2-MD16TA-1.*)
Always turn OFF the communications, internal, and I/O power supplies before removing or attaching the circuit section.



## 5-5-16 Mounting in Control Panels

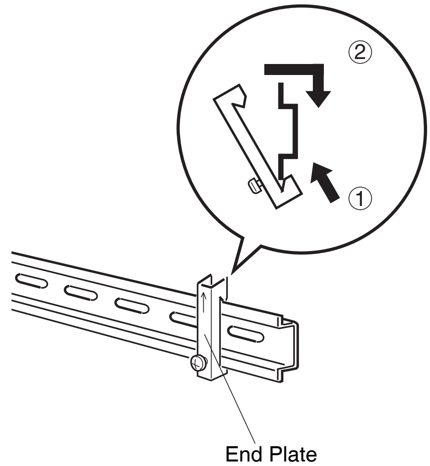
A Remote I/O Terminal (Basic Unit or Expansion Unit) can be mounted in a control panel using either of the following methods.

### Using DIN Track

Mount the back of the Remote I/O Terminal to a 35-mm DIN Track. To mount the Terminal, pull down on the mounting hook on the back of the Terminal with a screwdriver, latch the DIN Track onto the back of the Terminal, and then secure the Terminal to the DIN Track. Secure all Slaves on both ends of the DIN Track with End Plates.

#### Connecting End Plates

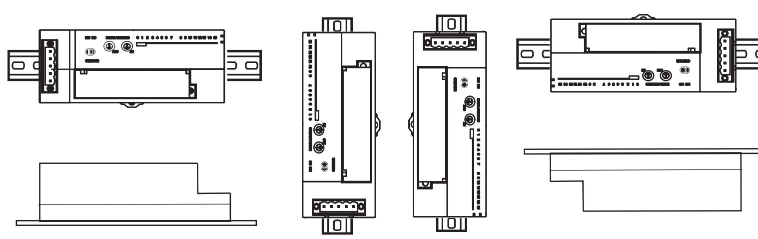
Hook the bottom of the End Plate onto the DIN Track, as shown at (1) in the following diagram, then hook the top of the End Plate as shown at (2).




**Note** Always attach an End Plate to both ends of Slaves connected to the DIN Track.

### Mounting Direction

Unless specific restrictions are given for the Slave, it can be mounted in any of the following six directions.

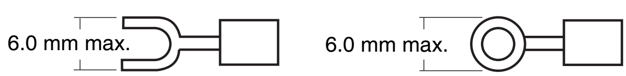


## 5-5-17 Wiring the I/O Power Supply and I/O Lines

The I/O power supplies and I/O lines are all wired to M3 screw terminals.

Connect M3 crimp terminals to the cables and then connect them to the Terminal Block.

Tighten the screws to a torque of 0.5 N·m.



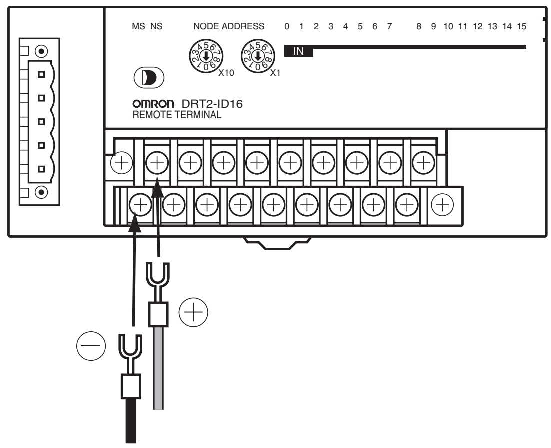

### Wiring the I/O Power Supply

Refer to the wiring details for Slave for information on the terminal arrangement at the terminal block.

Connect an I/O power supply to the Expansion Unit if required. (Refer to *5-5-2 Increasing I/O Using an Expansion Unit*.)

**Example:**

I/O power supply for a DRT2-ID16 Remote I/O Terminal.

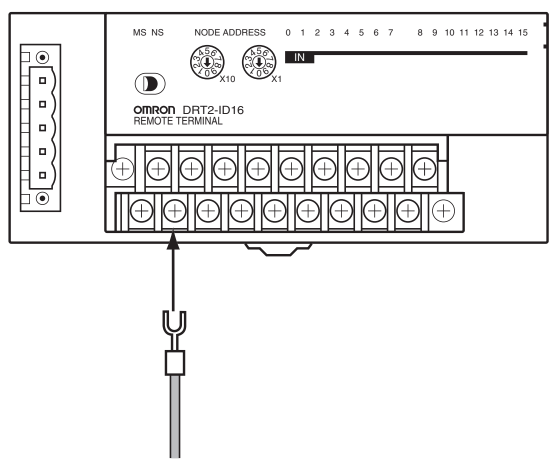



## Wiring I/O

Refer to the wiring details for the Slave for information on the terminal arrangement at the terminal block and external I/O wiring.

**Example:**

Wiring to input 0 on a DRT2-ID16 Remote I/O Terminal.



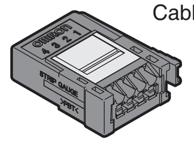

# 5-6 Connector Terminals with Transistors

## 5-6-1 Node Address, Baud Rate, and Output Hold/Clear Settings

These parameters are set in the same way as for Remote I/O Terminals with Transistors. Refer to *5-5-1 Node Address, Baud Rate, and Output Hold/Clear Settings*.

## 5-6-2 Industry Standard Sensor Connector Assembly, Wiring, and Installation

The DRT2-□D16S(-1) Sensor Connector Terminal uses an industry standard sensor connector. When connecting the sensor or external device to the Connector Terminal, a special connector must be attached to the sensor or external device cable.



OMRON XN2A-1470
Cable Connector

Use the following procedure to attach the Cable Connector to the sensor or external device cable.

***1,2,3...***

1. Checking the Cable Connector and Cable Wire Size
   The applicable Cable Connector depends on the manufacturer and the wire size. Use the following table to check that the Cable Connector and sensor or external device cable wire size are compatible.

**Tyco Electronics Corporation**

| Model | Housing color | Applicable wire range | |
|---|---|---|---|
| 3-1473562-4 | Orange | Sheath outer diameter: 0.6 to 0.9 mm dia. | Cross section: 0.08 to 0.5 mm$^2$ |
| 1-1473562-4 | Red | Sheath outer diameter: 0.9 to 1.0 mm dia. | |
| 1473562-4 | Yellow | Sheath outer diameter: 1.0 to 1.15 mm dia. | |
| 2-1473562-4 | Blue | Sheath outer diameter: 1.15 to 1.35 mm dia. | |
| 4-1473562-4 | Green | Sheath outer diameter: 1.35 to 1.60 mm dia. | |

**Sumitomo 3M**

| Model | Housing color | Applicable wire range |
|---|---|---|
| 37104-3101-000FL | Red | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 0.8 to 1.0 mm |
| 37104-3122-000FL | Yellow | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 1.0 to 1.2 mm |
| 37104-3163-000FL | Orange | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 1.2 to 1.6 mm |
| 37104-2124-000FL | Green | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.0 to 1.2 mm |
| 37104-2165-000FL | Blue | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.2 to 1.6 mm |
| 37104-2206-000FL | Gray | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.6 to 2.0 mm |

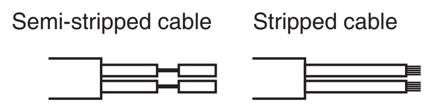
**OMRON**

| Model | Specifications | Applicable wire range |
|---|---|---|
| XN2A-1470 | Spring clamp type | AWG28 (0.08 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.5 mm max. |

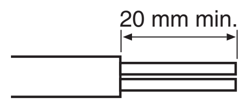
2. Preparing the Sensor or External Device Cables

**Using Tyco Electronics Amp or Sumitomo 3M Connectors**

The sensor and external device cables for connector output with transistors are normally either semi-stripped or stripped, as shown in the following diagram.

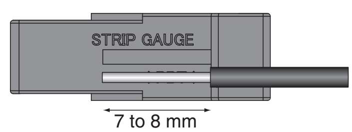



When the cables are prepared this way, a Cable Connector cannot be attached, so first cut the end and remove the cable sheath as shown in the following diagram. (Do not strip the core wires.)




**Using OMRON Connectors**

Align the cable with the strip gauge on the side of the connector. Remove 7 to 8 mm of the wiring sheath, and twist the exposed wires several times.



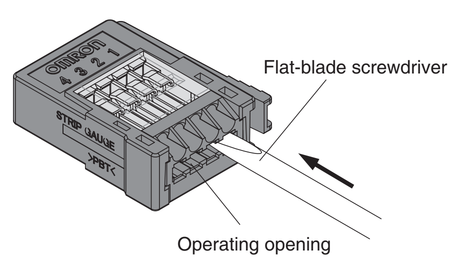

3. Inserting the Wire into the Cable Connector (Hard Wiring Procedure)

**Using Tyco Electronics Amp or Sumitomo 3M Connectors**

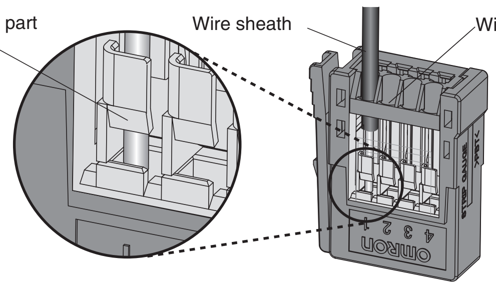
***1,2,3...***
1. Insert the wire into the cover of the Cable Connector. Check that the terminal number and wire color match, and insert all the way to the back of the connector.
2. Join the cover and plug connector, using pliers or another tool to push in fully. At the same time, push in the middle of the cover straight so that it is not crooked.

**Using OMRON Connectors**

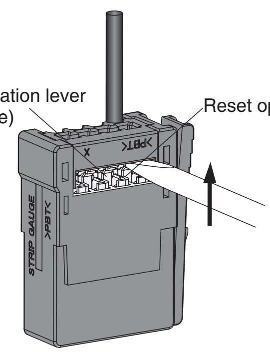
***1,2,3...***
1. Use a flat-blade screwdriver to push the operation lever inside the connector's operation opening until it locks, as shown in the following diagram.



2. Insert the line all the way to the back of the wire insertion opening. Check that the sheath of the line is inserted into the wire insertion opening, and that the end of the conductor has passed through the connection part.




3. Insert a flat-blade screwdriver into the reset opening and pull back the lever lightly. A click sound will be heard and the operation lever will return to its normal position.




4. Check that the operation lever has returned to its position. Lightly pull on the lines, and if there is any resistance, they are connected properly.

**Note** When connecting the sensor, insert the wire so that the terminal number on the cover matches the sensor wire color, as shown in the following table.

| | **Using DRT2-ID16S** | | **Using DRT2-ID16S-1** | |
|---|---|---|---|---|
| Terminal number | 3-wire sensor (without self-diagnostic output function) | 2-wire sensor (without self-diagnostic output function) | 3-wire sensor (without self-diagnostic output function) | 2-wire sensor (without self-diagnostic output function) |
| 1 | Brown (red) | --- | Brown (red) | Brown (white) |
| 2 | --- | --- | --- | --- |
| 3 | Blue (black) | Blue (black) | Blue (black) | --- |
| 4 | Black (white) | Brown (white) | Black (white) | Blue (black) |

**Note** Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

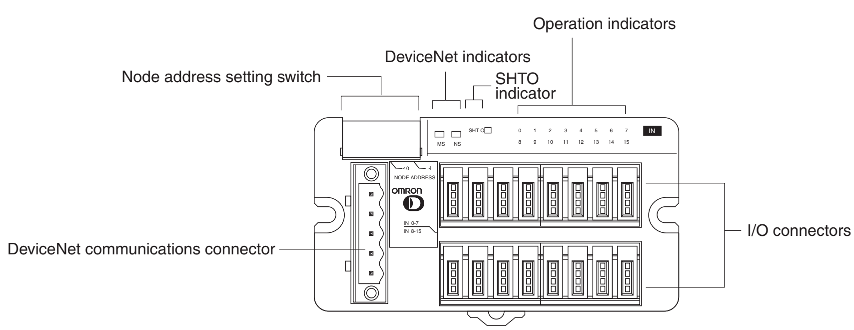
**Note** To remove a wire, push in the operation lever, check that the operation lever has locked, and then pull out the wire. After removing the wire, always return the operation lever to its normal position.

## 5-6-3 Connector Terminals with 16 Transistor Inputs: DRT2-ID16S (NPN) and DRT2-ID16S-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID16S | DRT2-ID16S-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 9 V DC min. (between each input terminal and V) | 9 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 11 mA max./point (for 24 V DC)<br>3.0 mA max./point (for 11 V DC) | 11 mA max./point (for 24 V DC)<br>3.0 mA max./point (for 11 V DC) |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |
| Sensor short-circuit detection current | 100 mA min. (per two inputs)<br>The total current for all of the following input points is monitored to detect sensor short-circuits.<br>IN0/IN1, IN2/IN3, IN4/IN5, IN6/IN7, IN8/IN9, IN10/IN11, IN12/IN13, IN14/IN15 | |
| Current supplied to input devices | 50 mA/input | |

### Component Names and Functions: DRT2-ID16S and DRT2-ID16S-1

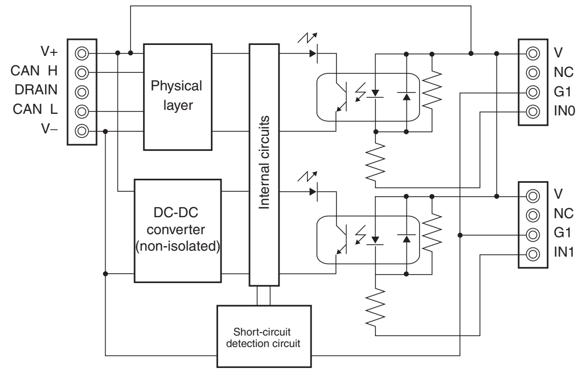



#### Indicator Meanings

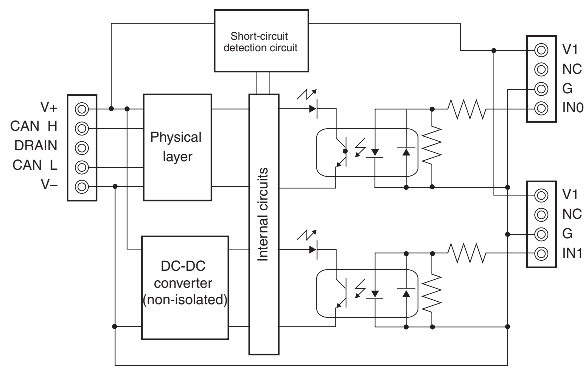
| Indicator name | Color | Status | Meaning |
|---|---|---|---|
| SHT0 | Red | Lit | The sensor power supply has short-circuited. |

## Internal Circuits

### DRT2-ID16S (NPN)

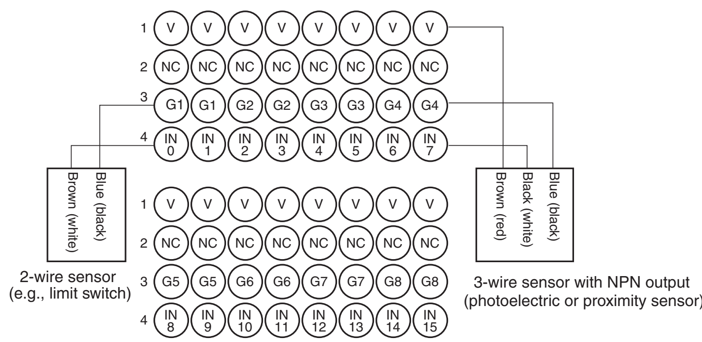



### DRT2-ID16S-1 (PNP)

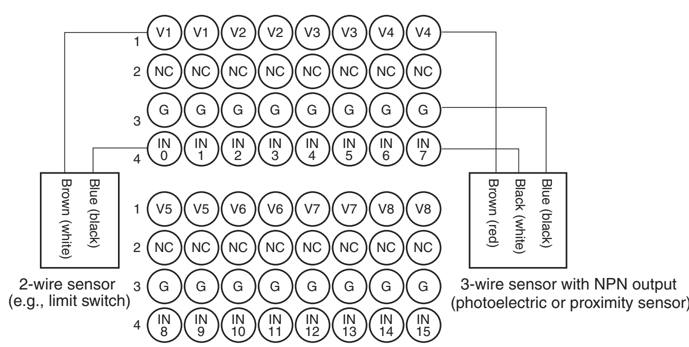



## Wiring

### DRT2-ID16S (NPN)

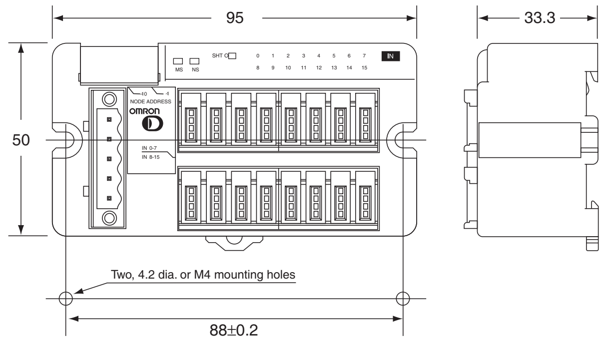



### DRT2-ID16S-1 (PNP)




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions (DRT2-ID16S and DRT2-ID16S-1)




# 5-6-4 Connector Terminals (Sensor Connector Type with 8 Inputs and 8 Outputs): DRT2-MD16S (NPN) and DRT2-MD16S-1 (PNP)

## Input Specifications

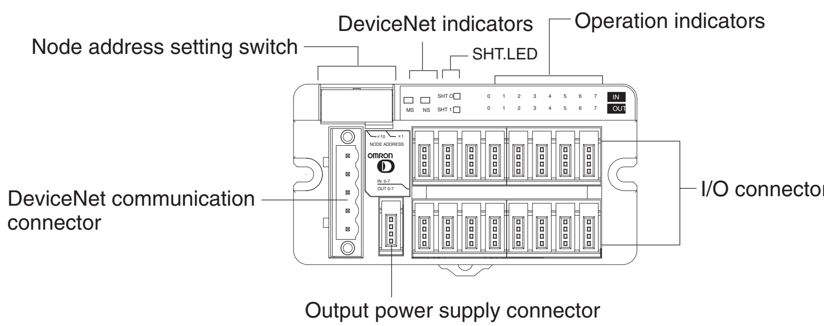
| Item | Specification | |
|---|---|---|
| Model | DRT2-MD16S | DRT2-MD16S-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 9 V DC min. (between each input terminal and V) | 9 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 11 mA max./point at 24 V DC<br>3.0 mA min./point at 11 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |
| Sensor short-circuit detection current | 100 mA min. (per two inputs)<br>The total current for all of the following input points is monitored to detect sensor short-circuits.<br>IN0/IN1, IN2/IN3, IN4/IN5, IN6/IN7 | |
| Current supplied to input devices | 50 mA/input | |

## Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-MD16S | DRT2-MD16S-1 |

| Item | Specification | |
|---|---|---|
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 0.3 A/point, 2.4 A/common | 0.3 A/point, 1.6 A/common |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |
| External load short-circuit detection current | 2.4 A min. per common | 1.6 A min. per common |
| Current supplied to output devices | 100 mA/output | |

## Components of the DRT2-MD16S and DRT2-MD16S-1

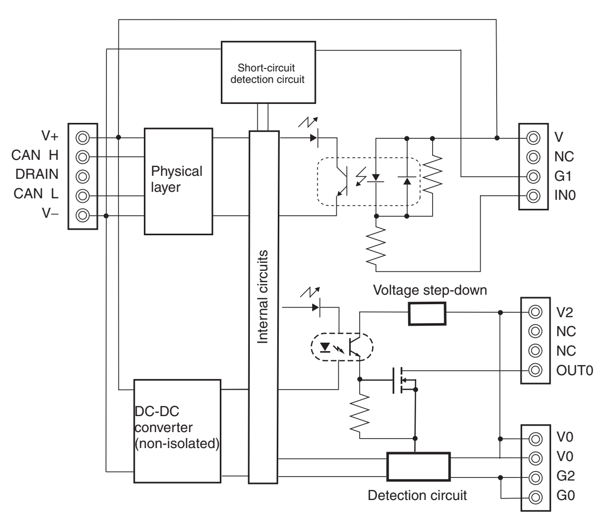



### Indicator Meanings

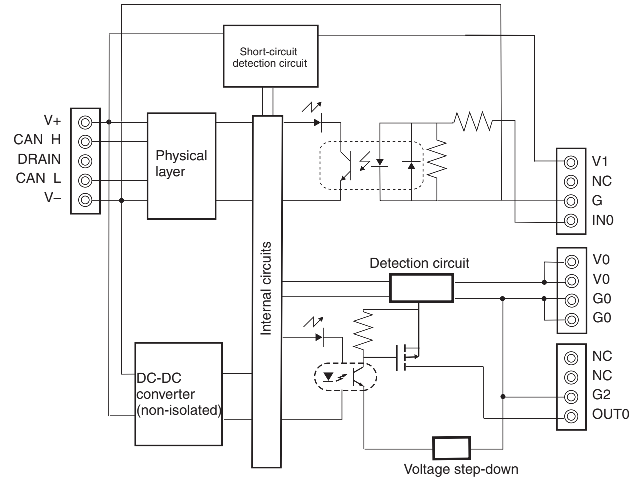
| Indicator name | Color | Status | Meaning |
|---|---|---|---|
| SHT0 | Red | Lit | Sensor power short-circuit |
| SHT1 | Red | Lit | External load short-circuit |

## Internal Circuits

### DRT2-MD16S (NPN)

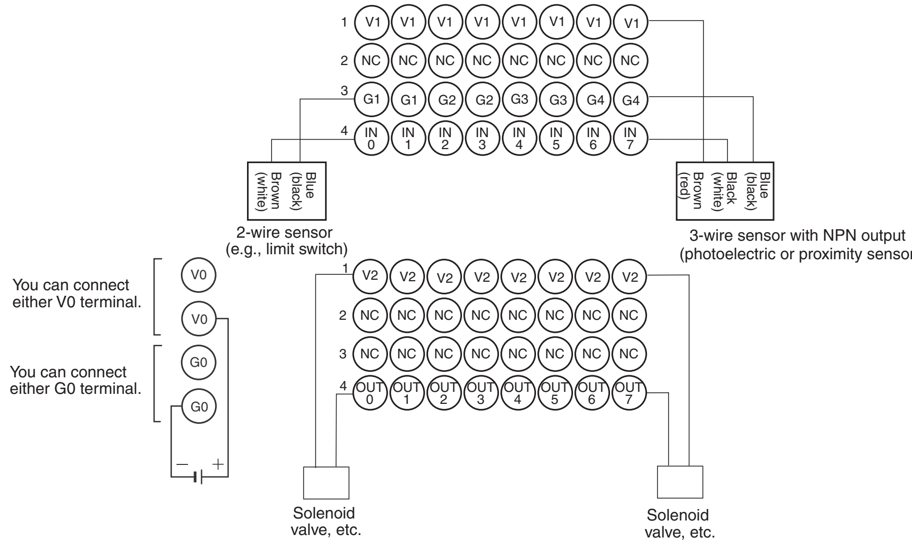


### DRT2-MD16S-1 (NPN)

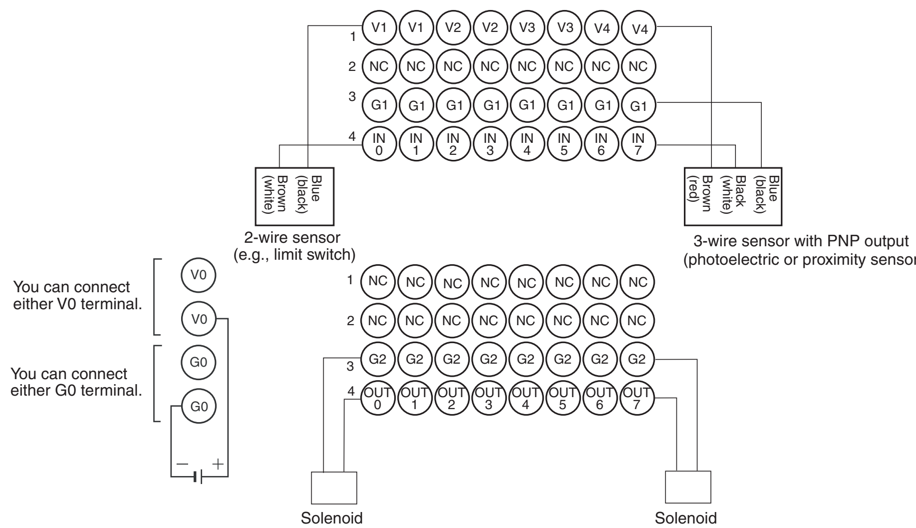



## Wiring

### DRT2-MD16S (NPN)

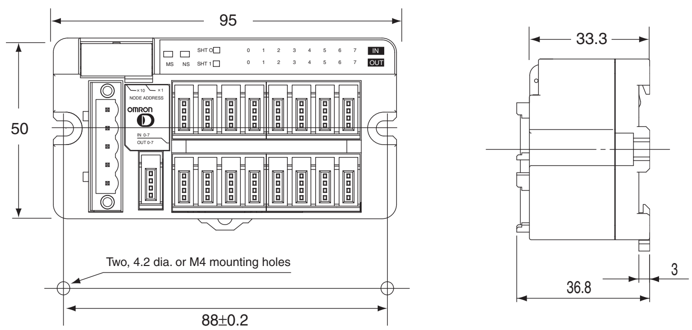



### DRT2-MD16S-1 (PNP)



**Note**
1. There are two V0 terminals and two G0 terminals for I/O power supply terminals in the output section. Use one pair of these terminals for the I/O power supply for this Unit and the other pair for the I/O power supply for the next Unit. Do not exceed 3 A for either pair.
2. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions (DRT2-MD16S and DRT2-MD16S-1)



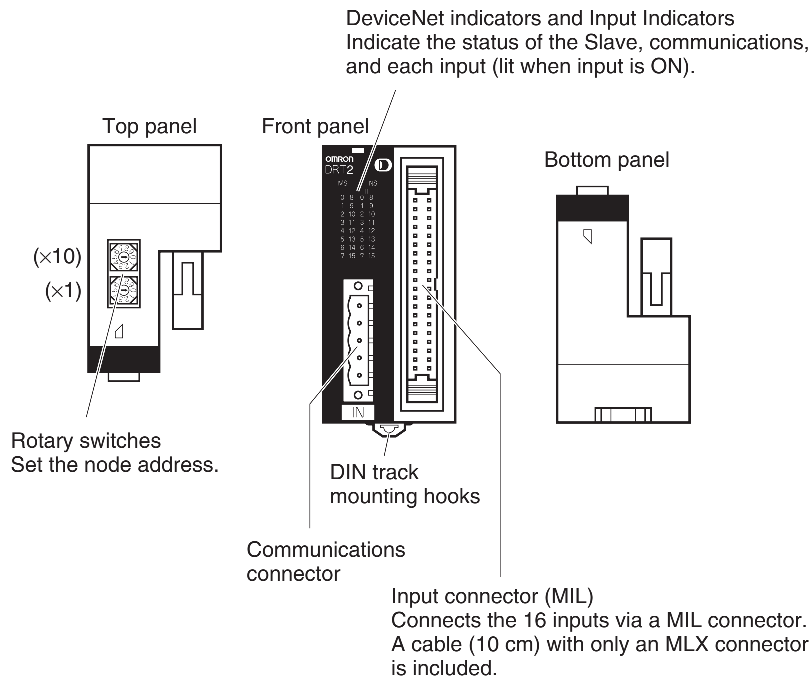

# 5-6-5 Transistor Remote Input Terminals with 16 Points and Connectors: DRT2-ID16ML(X) (NPN) and DRT2-ID16ML(X)-1 (PNP)

## Input Specifications

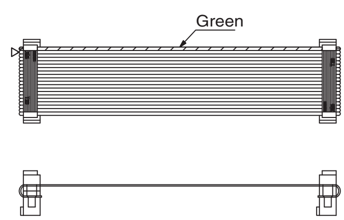
| Item | Specification | |
|---|---|---|
| Model | DRT2-ID16ML(X) | DRT2-ID16ML(X)-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 17 V DC min. (between each input terminal and V) | 17 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max./point at 24 V DC<br>3.0 mA min./point at 17 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Max. simultaneously ON input points | 16 points (See note.) | |
| Number of circuits | 16 points with one common | |

**Note** All 16 inputs can be ON simultaneously if the Remote I/O Terminal is mounted facing up, but sufficient space will need to be allowed between Units depending on the ambient temperature. Refer to the *Dimensions* diagram on page 160 for details.

## Components of the DRT2-ID16ML(X) and DRT2-ID16ML(X)-1




Cable with Connectors (MLX Models Only)



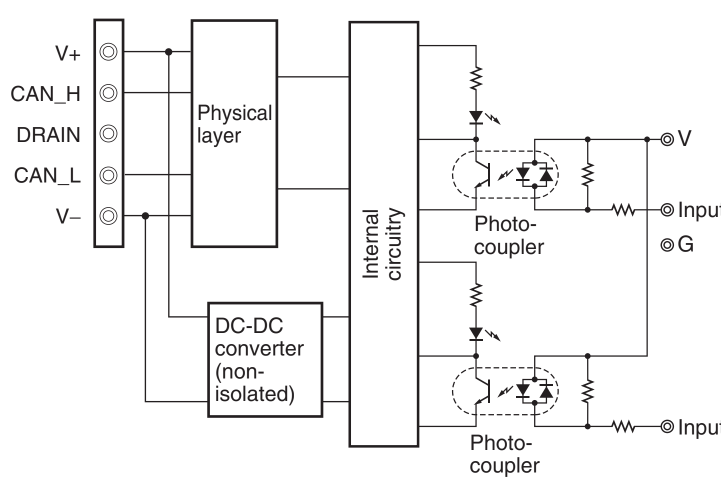

### Input Indicators

| Name | Meaning |
|---|---|
| 0 to 15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when input is ON; not lit when input is OFF. |

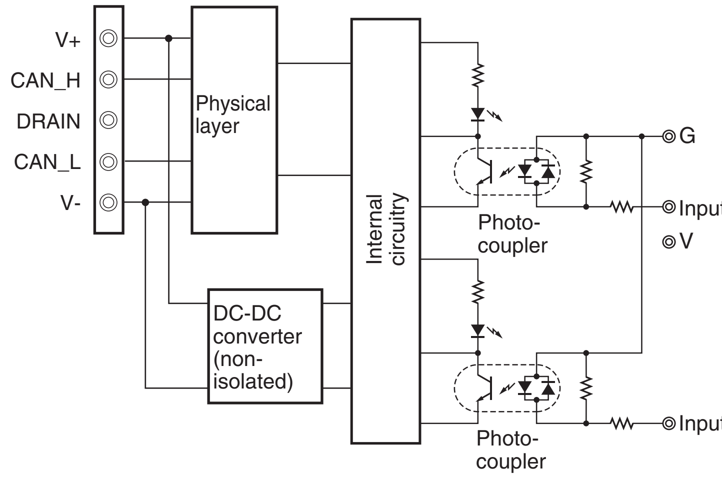
**Note** "m" is the first word allocated to the Remote Input Terminal.

## Internal Circuits

### DRT2-ID16ML(X) (NPN)

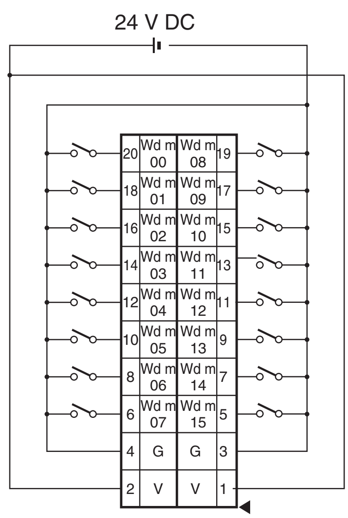


**DRT2-ID16ML(X)-1 (PNP)**

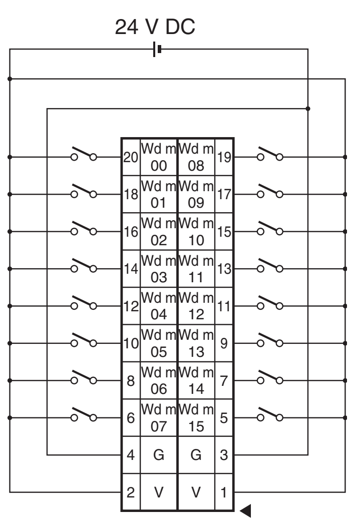



## Wiring

**DRT2-ID16ML(X) (NPN)**




**DRT2-ID16ML(X)-1 (PNP)**




**Note** 1. V terminals are connected internally, as are the G terminals. Connect them carefully.

2. Wire the V terminals and G terminals correctly so that the following functions operate properly.
   - I/O Power Status Monitor
   - Contact Operation Counter
   - Total ON Time Monitor
   - Function preventing malfunction caused by inrush current at startup.

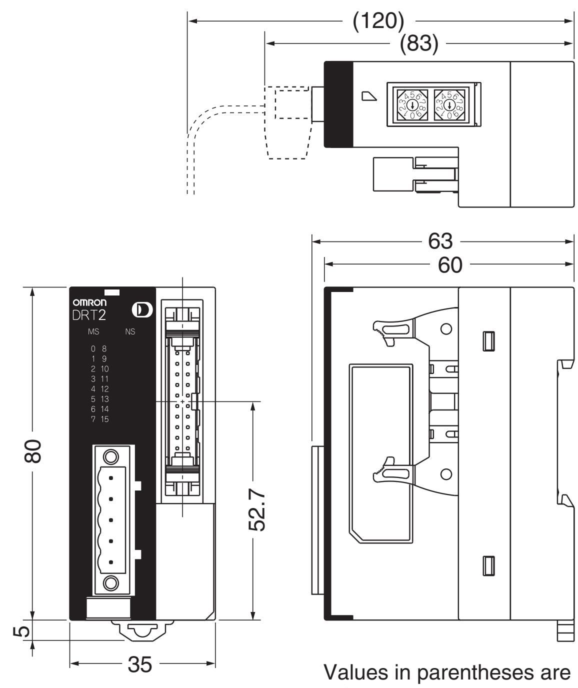
   If these functions are not being used, input signals will be received even if the G terminals of the DRT2-ID16ML(X) or V terminals of the DRT2-ID16ML(X)-1 are not connected.

## I/O Allocations

The first word allocated to the Remote Input Terminal is referred to as “word m.” Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 inputs |

## Dimensions (DRT2-ID16ML(X) and DRT2-ID16ML(X)-1)

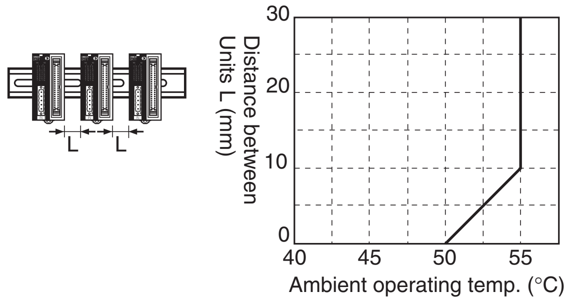



Values in parentheses are reference values.

**Note** There are restriction when using the 16-point Transistor Remote Input Terminals with Connectors depending on the ambient operating temperature.

- If the Terminals are not mounted facing up, they can be mounted side-by-side and all inputs can be turned ON simultaneously at 55°C or less.
- If the Terminals are mounted facing up, the distances and temperatures in the graph given below must be maintained to enable turning ON all

inputs simultaneously. For example, at an ambient temperature of 55°C, the Terminals must be separated by at least 10 mm.



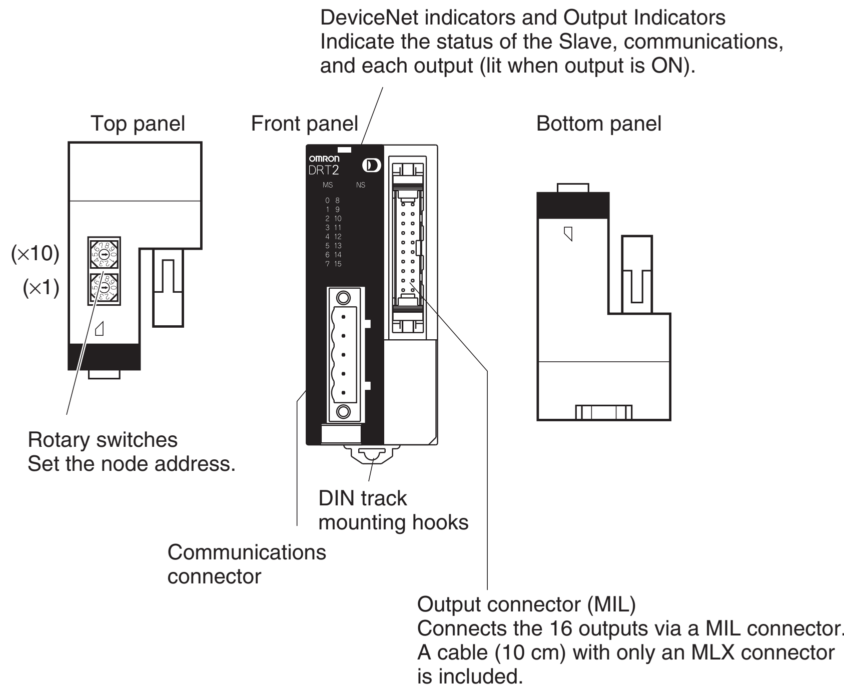

## 5-6-6 Connector Terminals (MIL Connector Type with 16 Outputs): DRT2-OD16ML(X) (NPN) and DRT2-OD16ML(X)-1 (PNP)

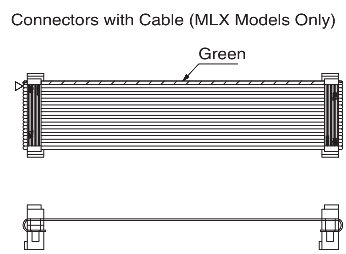
### Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-OD16ML(X) | DRT2-OD16ML(X)-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.3 A/point, 2 A/common (See note.) | |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

**Note** Do not allow the total load current to exceed 2 A and do not allow the load current on either the V or G terminal to exceed 1 A.

## Components of the DRT2-OD16ML(X) and DRT2-OD16ML(X)-1



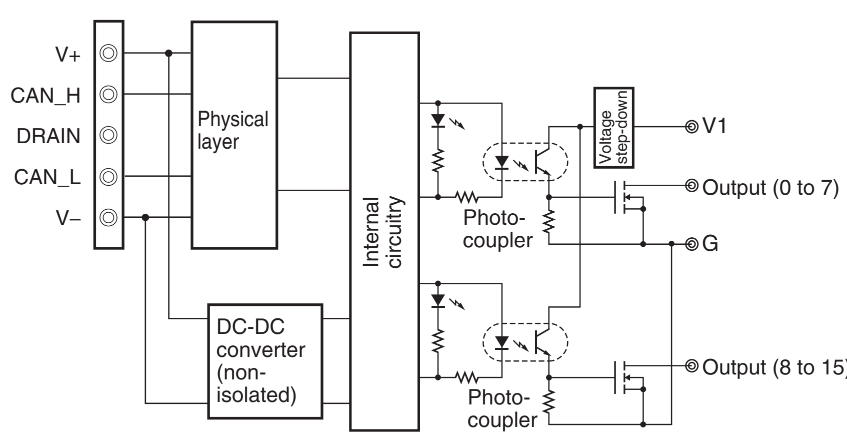

### Output Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when output is ON; not lit when output is OFF. |

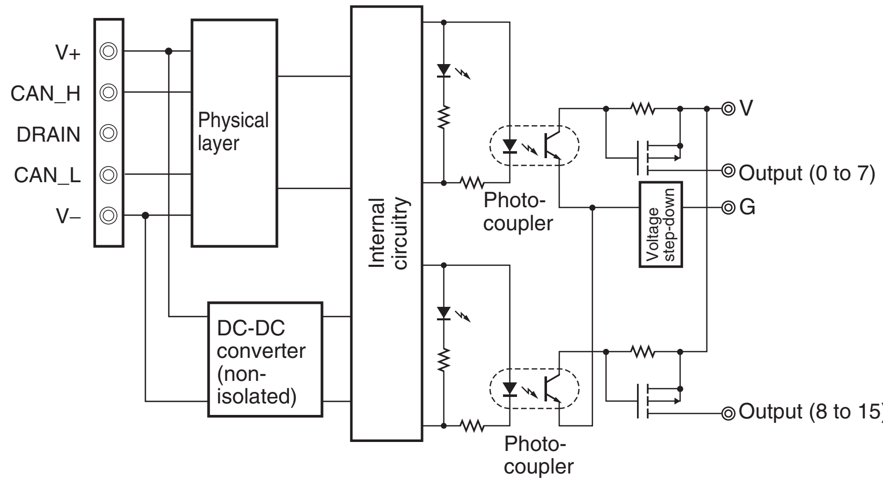
**Note** "m" is the first word allocated to the Remote Output Terminal.

## Internal Circuits

### DRT2-OD16ML(X) (NPN)

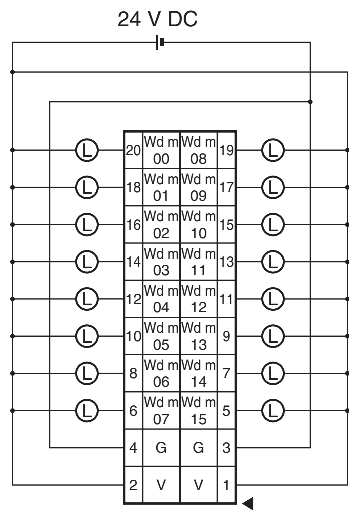


**DRT2-OD16ML(X)-1 (PNP)**

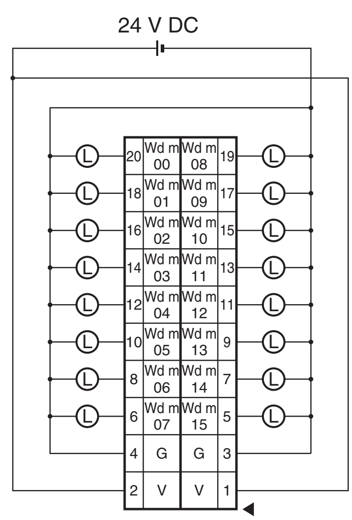



## Wiring

**DRT2-OD16ML(X) (NPN)**




**DRT2-OD16ML(X)-1 (PNP)**




**Note** 1. The V terminals are connected internally, as are the G terminals. When the power supply exceeds 1.0 A per terminal or the total current drawn by the external loads exceeds 2 A, the output power supply should not be input through the terminals; an external power supply must be used instead.

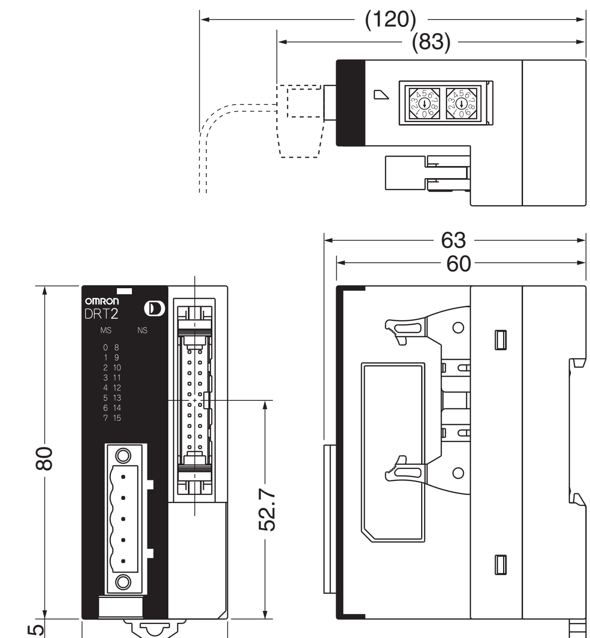
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## I/O Allocations

The first word allocated to the Remote Input Terminal is referred to as "word m." Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 outputs |

## Dimensions (DRT2-OD16ML(X) and DRT2-ID16ML(X)-1)




Values in parentheses are reference values.

# 5-6-7 Transistor Remote Input Terminals with 32 Points and Connectors: DRT2-ID32ML (NPN) and DRT2-ID32ML-1 (PNP)

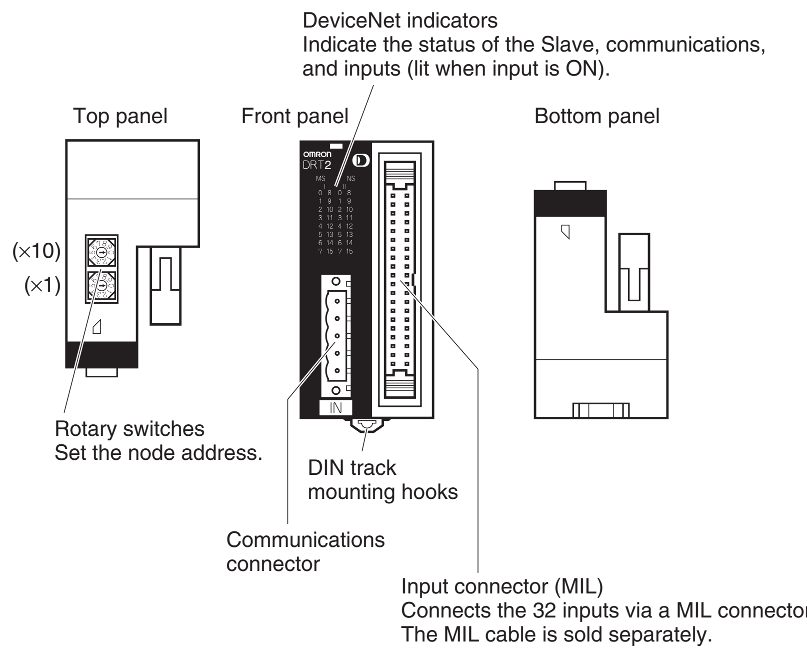
## Input Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-ID32ML | DRT2-ID32ML-1 |
| Internal I/O common | NPN | PNP |
| Input points | 32 points | |
| ON voltage | 17 V DC min. (between each input terminal and V) | 17 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max./point at 24 V DC<br>3.0 mA min./point at 17 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |

| Item | Specification |
|---|---|
| Max. simultaneously ON input points | 32 points (See note.) |
| Number of circuits | 32 points with one common |

**Note** All 32 inputs can be ON simultaneously if the Remote I/O Terminal is mounted facing up, but sufficient space will need to be allowed between Units depending on the ambient temperature. Refer to the *Dimensions* diagram on page 169 for details.

## Components of the DRT2-ID32ML and DRT2-ID32ML-1



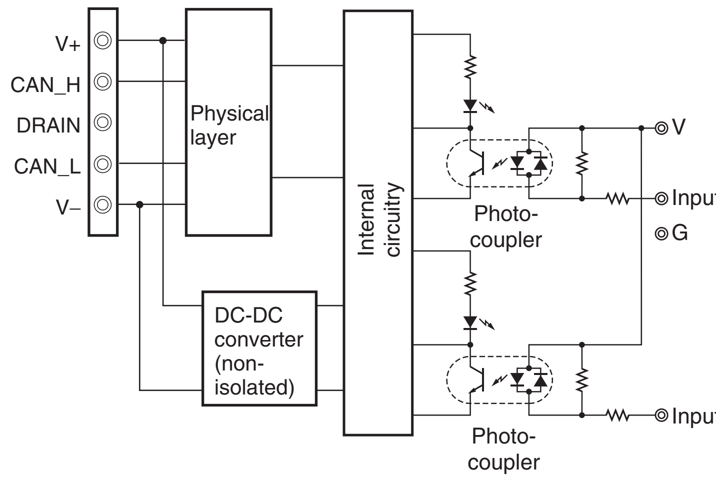

### Input Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when input is ON; not lit when input is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word m+1. Lit when input is ON; not lit when input is OFF. |

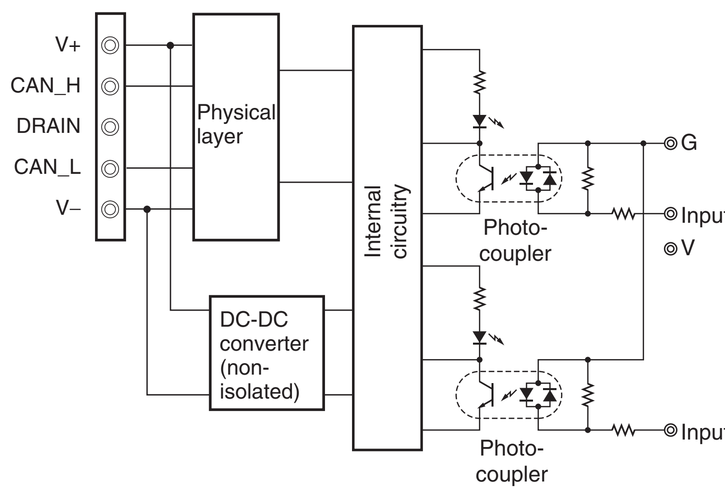
**Note** “m” is the first word allocated to the Remote Input Terminal.

## Internal Circuits

### DRT2-ID32ML (NPN)

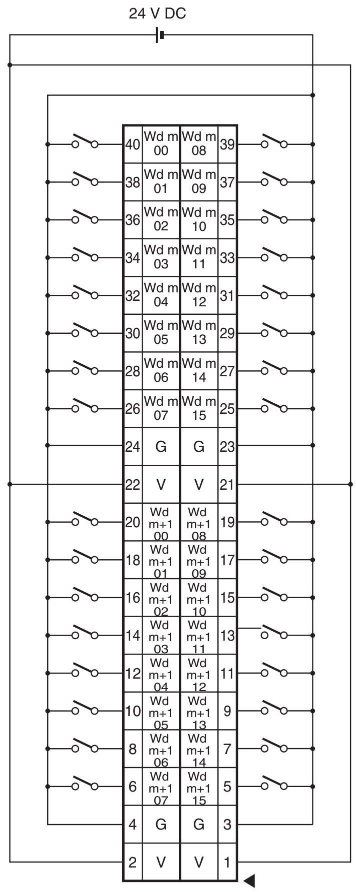



### DRT2-ID32ML-1 (PNP)

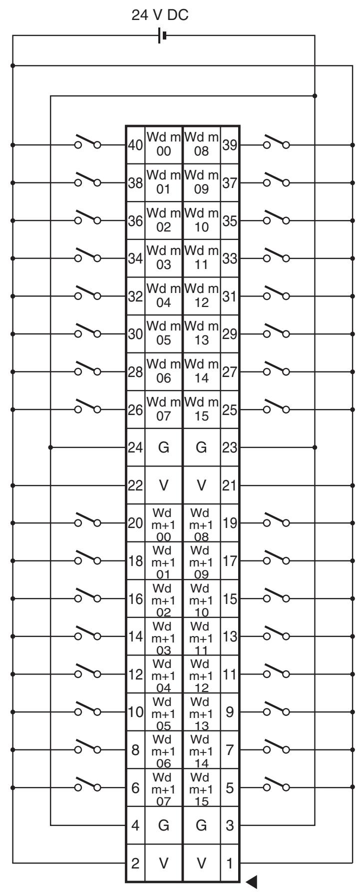


## Wiring

### DRT2-ID32ML (NPN)



**DRT2-ID32ML-1 (PNP)**




**Note**

1. V terminals are connected internally, as are the G terminals. Connect them carefully.
2. Wire the V terminals and G terminals correctly so that the following functions operate properly.
   - I/O Power Status Monitor
   - Contact Operation Counter
   - Total ON Time Monitor
   - Function preventing malfunction caused by inrush current at startup.

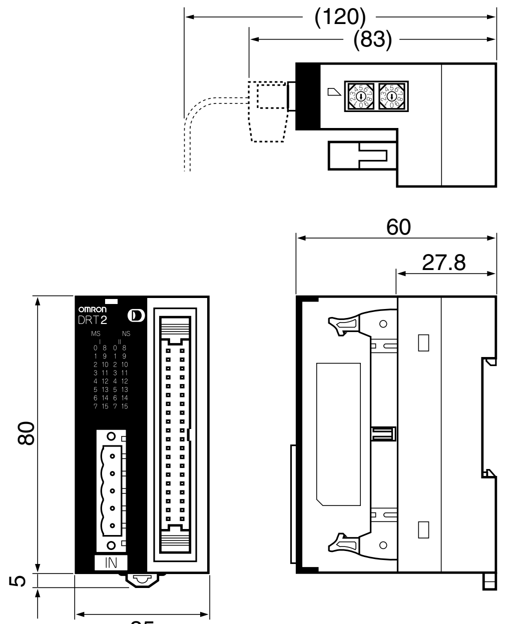
   If these functions are not being used, input signals will be received even if the G terminals of the DRT2-ID32ML or V terminals of the DRT2-ID32ML-1 are not connected.

## I/O Allocations

The first word allocated to the Remote Input Terminal is referred to as "word m." Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 inputs |
| Wd m+1 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 inputs |

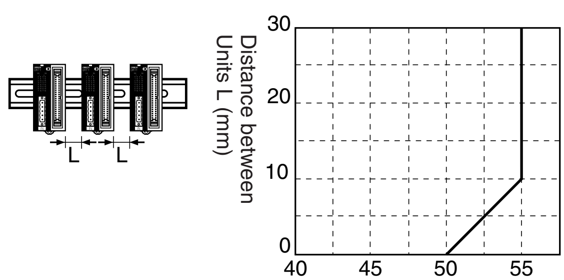
## Dimensions (DRT2-ID32ML and DRT2-ID32ML-1)




Values in parentheses are reference values.

**Note** There are restriction when using the 32-point Transistor Remote Input Terminals with Connectors depending on the ambient operating temperature.

- If the Terminals are not mounted facing up, they can be mounted side-by-side and all inputs can be turned ON simultaneously at 55°C or less.
- If the Terminals are mounted facing up, the distances and temperatures in the graph given below must be maintained to enable turning ON all inputs simultaneously. For example, at an ambient temperature of 55°C, the Terminals must be separated by at least 10 mm.



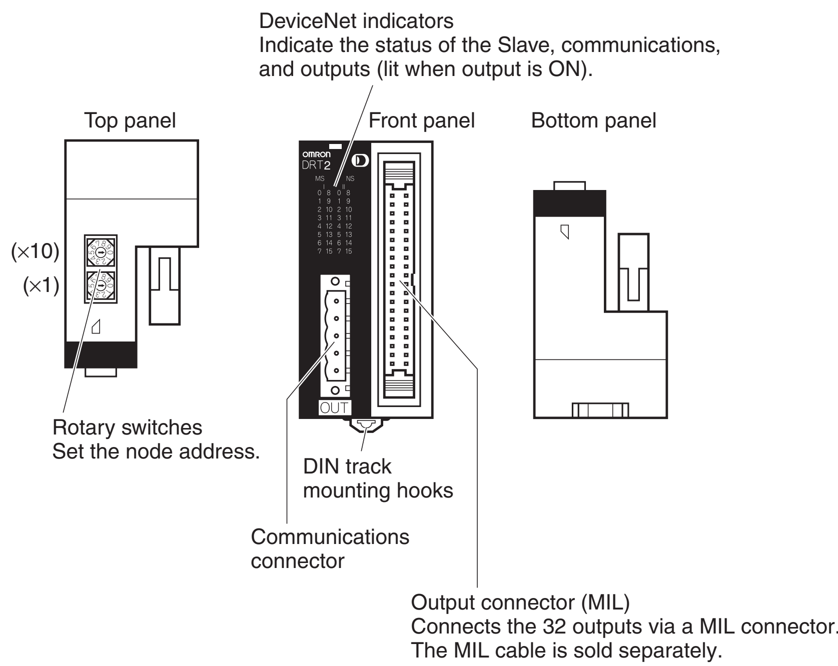
## 5-6-8 Transistor Remote Output Terminals with 32 Points and Connectors: DRT2-OD32ML (NPN) and DRT2-OD32ML-1 (PNP)

### Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-OD32ML | DRT2-OD32ML-1 |
| Internal I/O common | NPN | PNP |
| Output points | 32 points | |
| Rated output current | 0.3 A/point, 4 A/common (see note) | |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 32 points with one common | |

**Note** Do not allow the total load current to exceed 4 A and do not allow the load current on either the V or G terminal to exceed 1 A.

### Components of the DRT2-OD32ML and DRT2-OD32ML-1



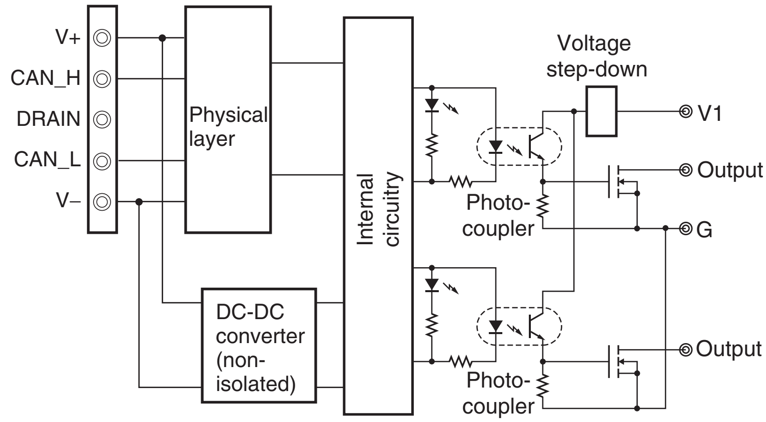

#### Output Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when output is ON; not lit when output is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word m+1. Lit when output is ON; not lit when output is OFF. |

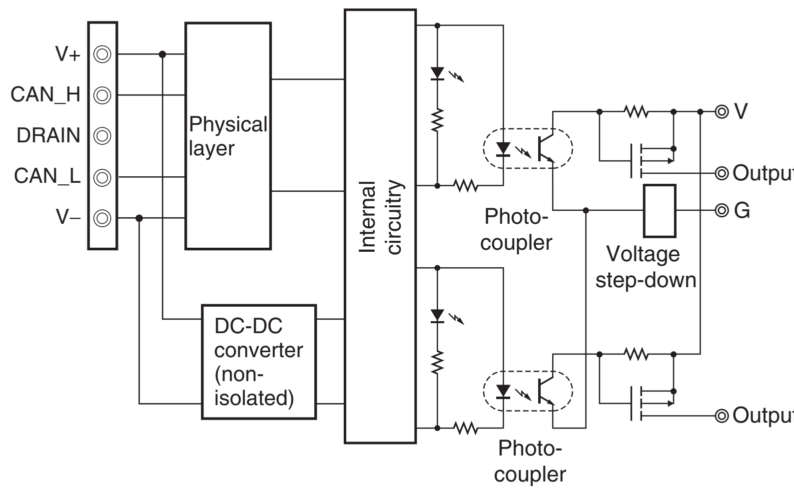
**Note** “m” is the first word allocated to the Remote Output Terminal.

## Internal Circuits

### DRT2-OD32ML (NPN)

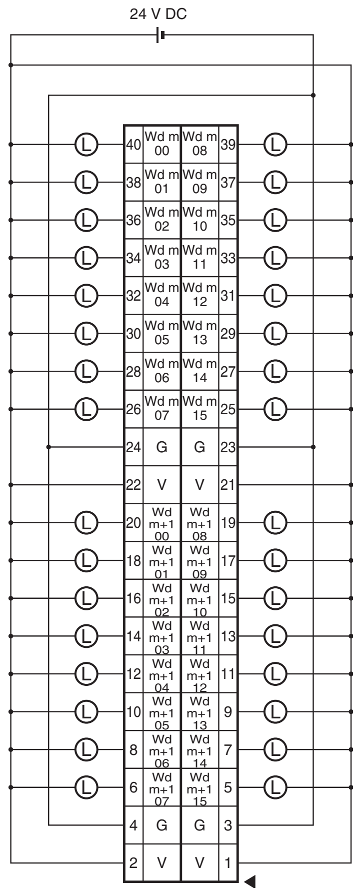



### DRT2-OD32ML-1 (PNP)

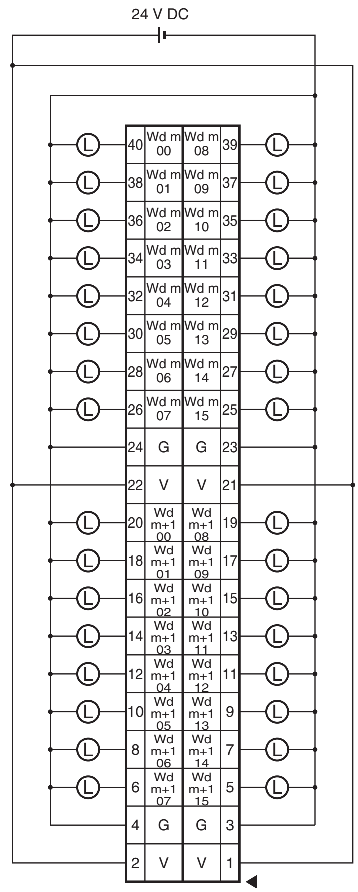


## Wiring

### DRT2-OD32ML (NPN)



### DRT2-OD32ML-1 (PNP)



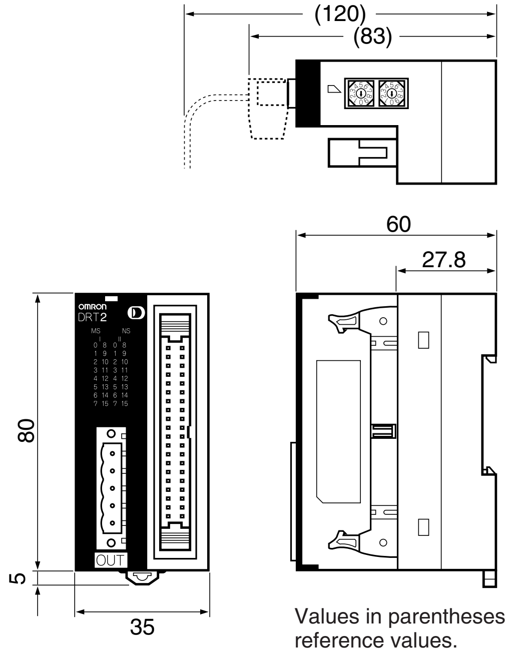

**Note**
1. The V terminals are connected internally, as are the G terminals. When the power supply exceeds 1.0 A per terminal or the total current drawn by the external loads exceeds 4 A, the output power supply should not be input through the terminals; an external power supply must be used instead.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)

**I/O Allocations**

The first word allocated to the Remote Output Terminal is referred to as "word m." Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 outputs |
| Wd m+1 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 outputs |

## Dimensions (DRT2-OD32ML and DRT2-OD32ML-1)




Values in parentheses are reference values.

## 5-6-9 Transistor Remote I/O Terminals with 16 Inputs and 16 Outputs and Connectors: DRT2-MD32ML (NPN) and DRT2-MD32ML-1 (PNP)

### Input Specifications

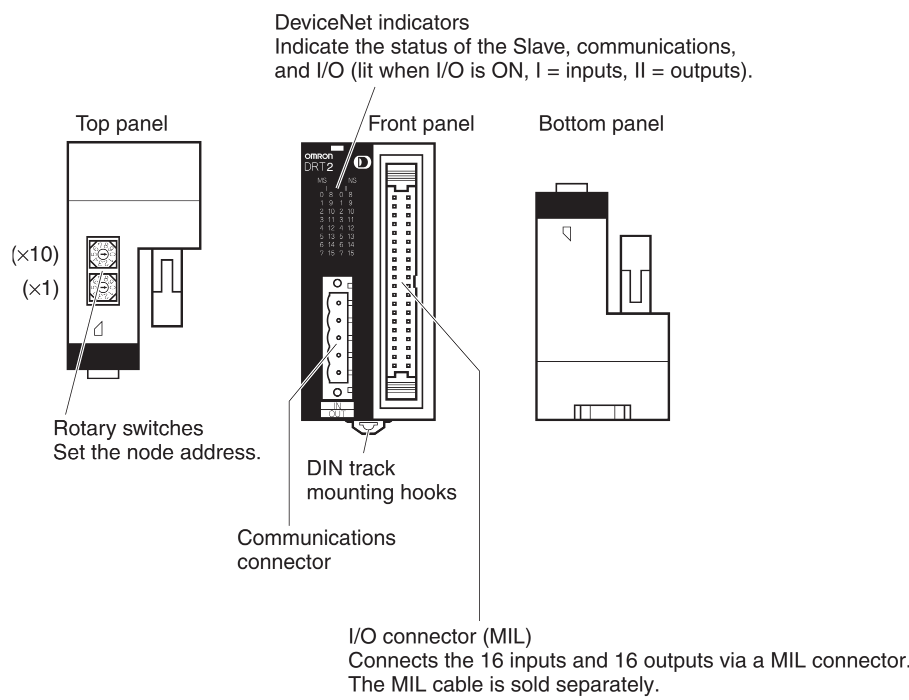
| Item | Specification | |
|---|---|---|
| Model | DRT2-MD32ML | DRT2-MD32ML-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 17 V DC min. (between each input terminal and V) | 17 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max./point at 24 V DC<br>3.0 mA min./point at 17 V DC | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Max. No. of ON inputs | 16 points | |
| Number of circuits | 16 points with one common | |

## Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-MD32ML | DRT2-MD32ML-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.3 A/point, 2 A/common (see note) | |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

**Note** Do not allow the total load current to exceed 2 A and do not allow the load current on either the V or G terminal to exceed 1 A.

## Components of the DRT2-MD32ML and DRT2-MD32ML-1



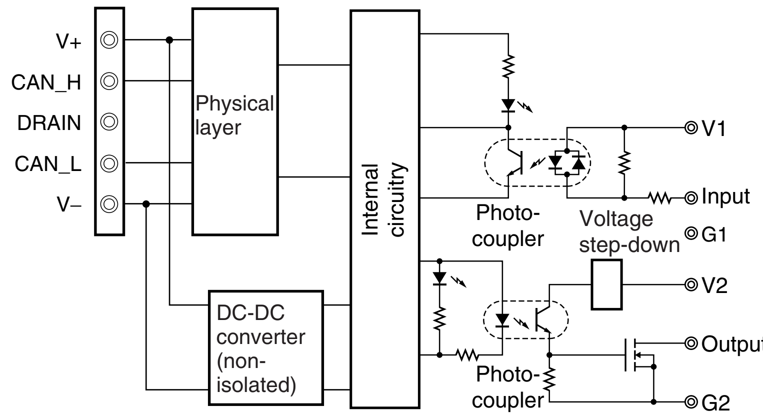

### I/O Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when input is ON; not lit when input is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word n. Lit when output is ON; not lit when output is OFF. |

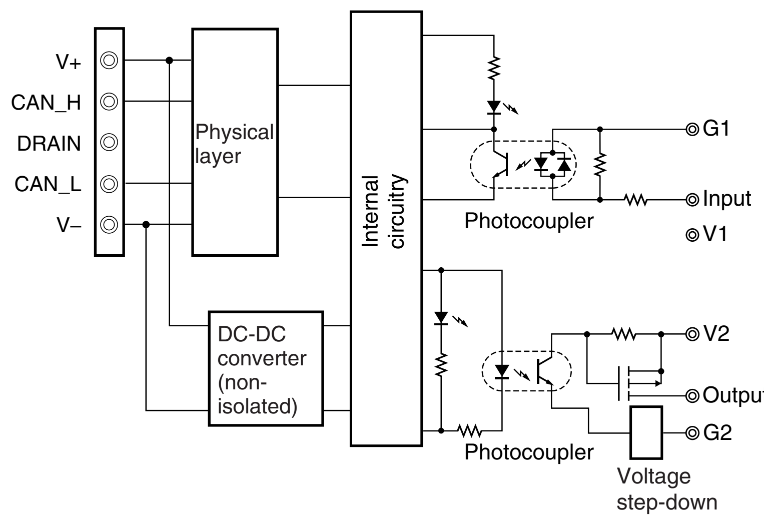
**Note** m: The first word allocated for the Remote I/O Terminal's IN Area.
n: The first word allocated for the Remote I/O Terminal's OUT Area.

## Internal Circuits

### DRT2-MD32ML (NPN)

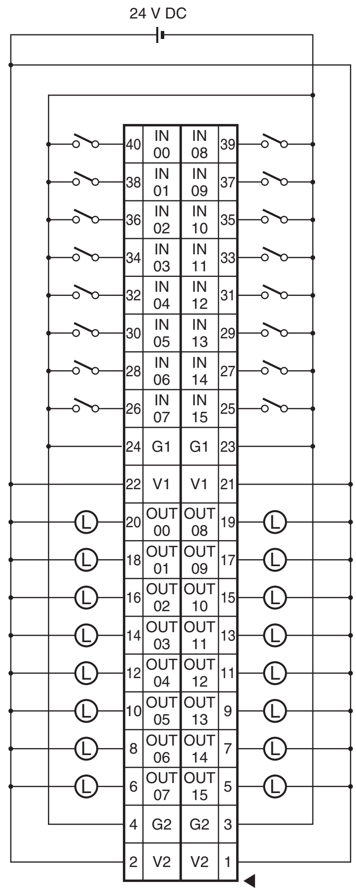



### DRT2-MD32ML-1 (PNP)

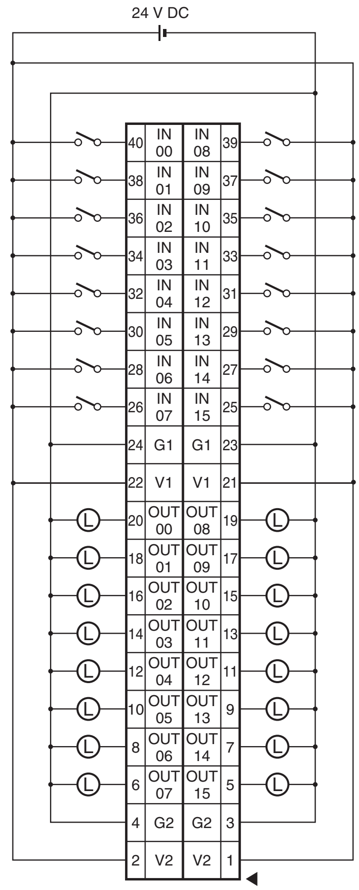


## Wiring

### DRT2-MD32ML (NPN)



**DRT2-MD32ML-1 (PNP)**




**Note**

1. The V1 terminals are connected internally, as are the V2 terminals, the G1, and the G2 terminals. (V1 is not connected to V2 and G1 is not connected to G2.) When the power supply exceeds 1.0 A per terminal or the total current drawn by the external loads exceeds 2 A, the output power supply should not be input through the terminals; an external power supply must be used instead.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Wire the V1 terminals and G1 terminals correctly so that the following functions operate properly.
   - I/O Power Status Monitor
   - Contact Operation Counter
   - Total ON Time Monitor
   - Function preventing malfunction caused by inrush current at startup.

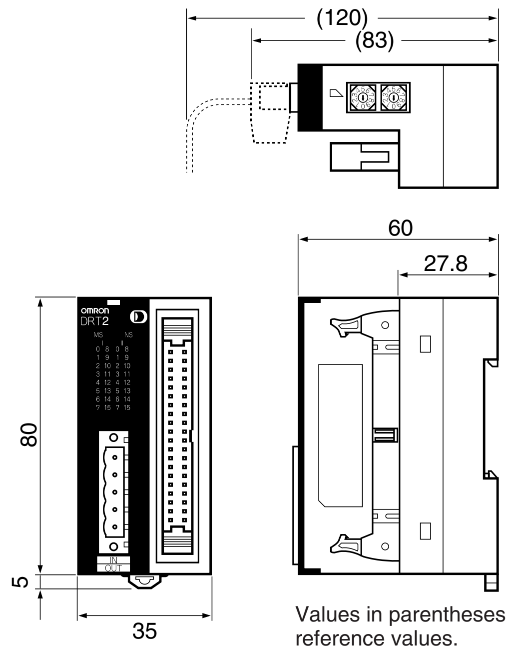
   If these functions are not being used, input signals will be received even if the G1 terminals of the DRT2-ID32ML or V1 terminals of the DRT2-ID32ML-1 are not connected.

**I/O Allocations**

The input word and output word allocated to the Remote I/O Terminal are referred to as “word m” and “word n” respectively. Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 inputs |
| Wd n | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 outputs |

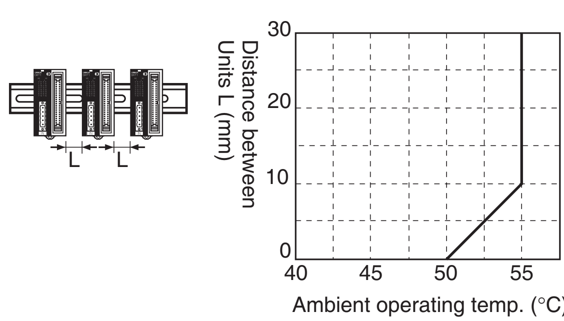
## Dimensions (DRT2-MD32ML and DRT2-MD32ML-1)




Values in parentheses are reference values.

**Note** There are restriction when using the 32-point Transistor Remote I/O Terminals with Connectors depending on the ambient operating temperature.

- If the Terminals are not mounted facing up, they can be mounted side-by-side and all inputs can be turned ON simultaneously at 55°C or less.
- If the Terminals are mounted facing up, the distances and temperatures in the graph given below must be maintained to enable turning ON all inputs simultaneously. For example, at an ambient temperature of 55°C, the Terminals must be separated by at least 10 mm.



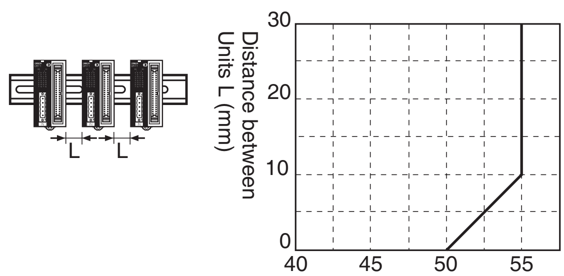
## Mounting in Control Panels

Either of the following three methods can be used to mount an Remote I/O Terminal in a control panel.

- Mounting to DIN Track
- Mounting perpendicular to a panel using a Mounting Bracket
- Mounting parallel to a panel using a Mounting Bracket

**Note**

1. There are restriction when using the 32-point Transistor Remote I/O Terminals with Connectors or 32-point Transistor Remote Input Terminals with Connectors depending on the ambient operating temperature.
   - If the Terminals are not mounted facing up, they can be mounted side-by-side and all inputs can be turned ON simultaneously at 55°C or less.
   - If the Terminals are mounted facing up, the distances and temperatures in the graph given below must be maintained to enable turning ON all inputs simultaneously. For example, at an ambient temperature of 55°C, the Terminals must be separated by at least 10 mm.



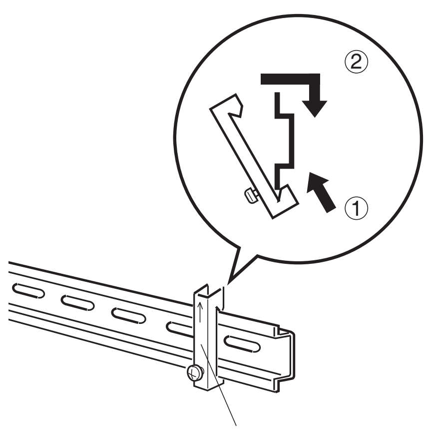

2. Remote I/O Terminals with Connectors cannot be mounted to a control panel with just screws; the SRT2-ATT02 Mounting Bracket B (sold separately) must be used.

## Mounting to DIN Track

Mount the back of the Remote I/O Terminal to a 35-mm DIN Track. To mount the Terminal, pull down on the mounting hook on the back of the Terminal with a screwdriver, insert the DIN Track on the back of the Terminal, and then secure the Terminal to the DIN Track. When finished, secure all Slaves on both ends of the DIN Track with End Plates.

### Connecting End Plates

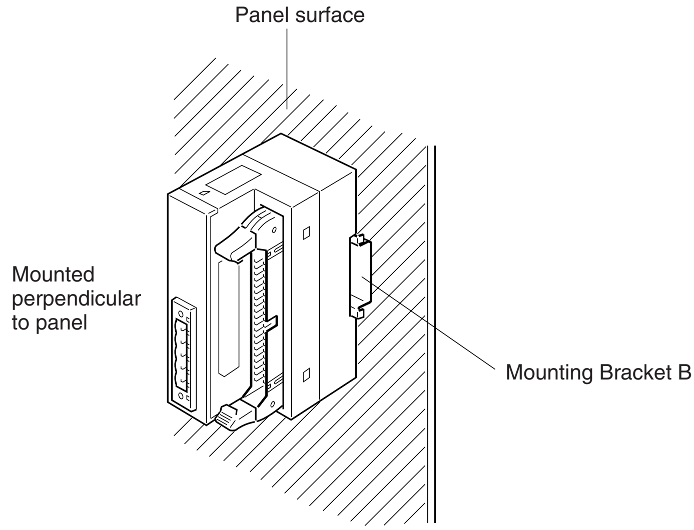
Hook the bottom of the End Plate onto the DIN Track, as shown at (1) in the following diagram, then hook the top of the End Plate as shown at (2).




**Note** Always attach End Plate to both ends of Slaves connected to DIN Track.

## Mounting Perpendicular to a Panel Using a Mounting Bracket

A Remote I/O Terminal with a Connector can be mounted perpendicular to a panel by using the SRT2-ATT02 Mounting Bracket B (sold separately).

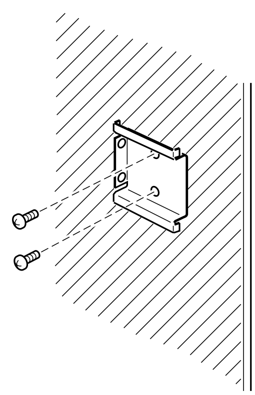



**Mounting Method**

Use the following procedure to mounted the Remote I/O Terminal.

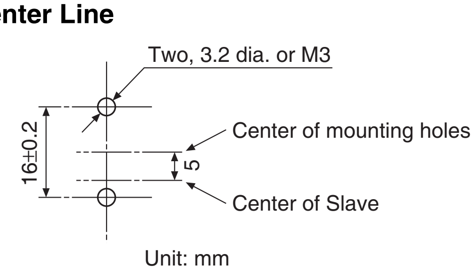
***1,2,3...***

1. Mount the SRT2-ATT02 Mounting Bracket B to the wall using two Phillip's screws as shown below. Refer to *Mounting Bracket Dimensions* on page 184 for mounting dimensions.



2. Mount the Remote I/O Terminal to the Mounting Bracket B. The Mounting Bracket B is shaped like a DIN Track. Use the same mounting procedure as for DIN Track.

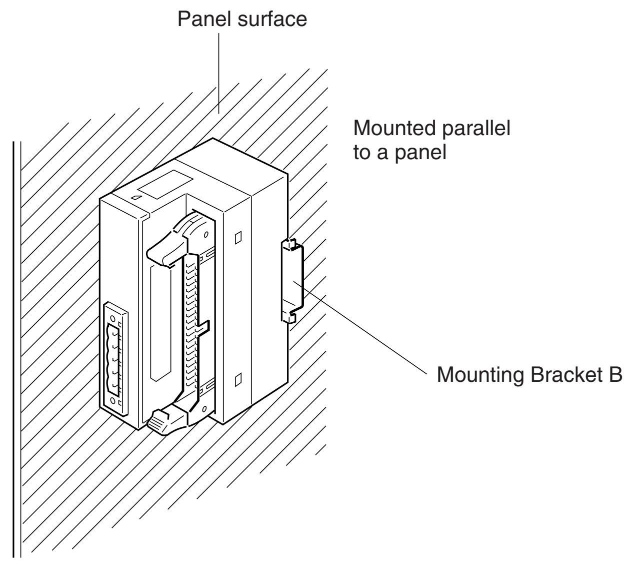
**Mounting Holes and Slave Center Line**



## Mounting Parallel to a Panel Using a Mounting Bracket

A Remote I/O Terminal with a Connector can be mounted parallel to a panel by using the SRT2-ATT02 Mounting Bracket B (sold separately).

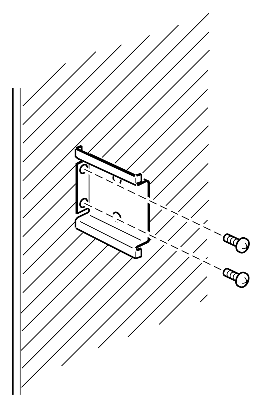
**Note** A multi-drop DeviceNet connector cannot be used if the Remote I/O Terminal is mounted parallel to the panel.




**Mounting Method**

Use the following procedure to mount the Remote I/O Terminal.

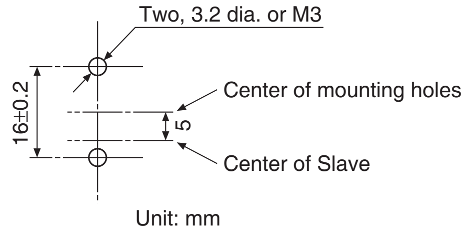
*1,2,3...*
1. Mount the SRT2-ATT02 Mounting Bracket B to the wall using two Phillip's screws as shown below.



2. Mount the Remote I/O Terminal to the Mounting Bracket B. The Mounting Bracket B is shaped like a DIN Track. Use the same mounting procedure as for DIN Track.

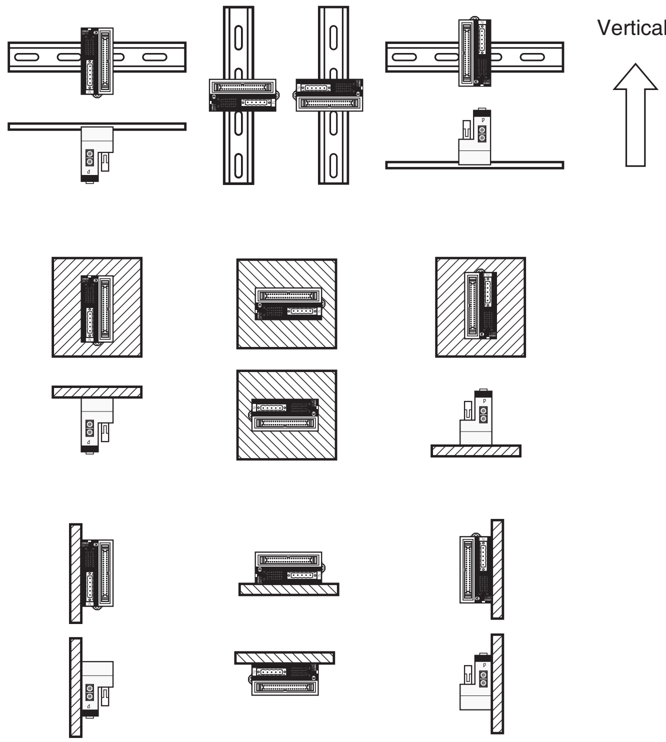
**Note** The multi-drop wiring connector cannot be used if the Remote I/O Terminal is mounted parallel to the panel.

**Mounting Holes and Slave Center Line**



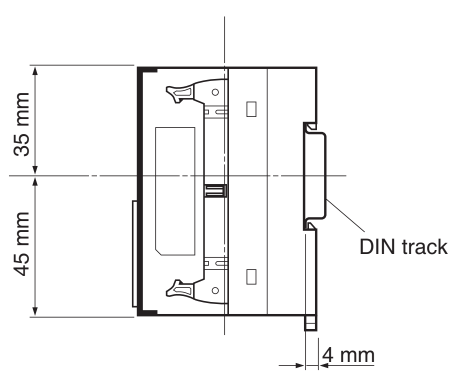

## Mounting Direction

Unless specific restrictions are given for the Slave, it can be mounted in any direction. Any of the following directions are okay.

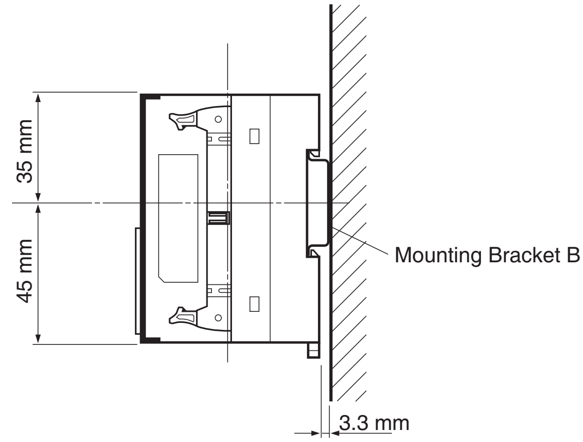



## Mounting Dimensions

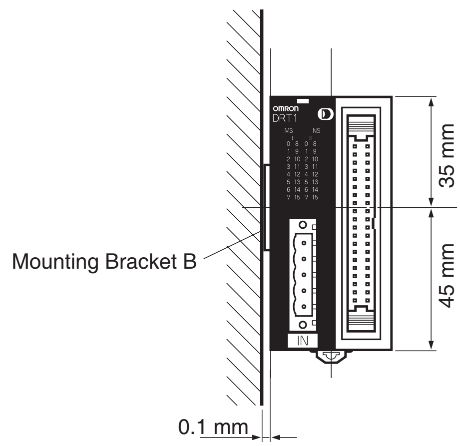
**Mounted to DIN Track**



**Mounted Perpendicular to a Panel**

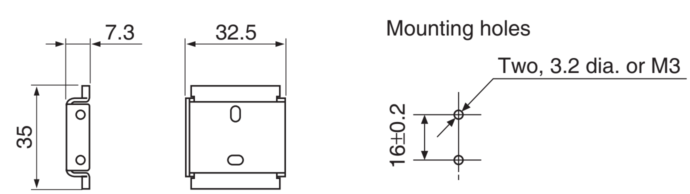



**Mounted Parallel to a Panel**




## Mounting Bracket Dimensions

The dimensions of the SRT2-ATT02 Mounting Bracket B are shown below.



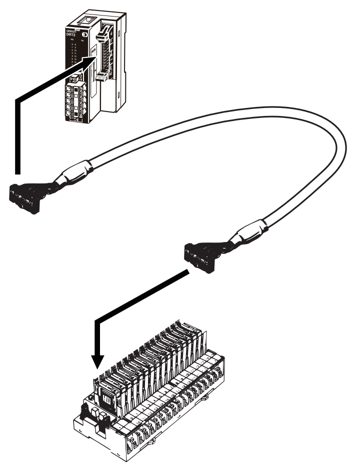

## Wiring Internal Power Supplies, I/O Power Supplies and I/O

Internal power is supplied together with the communications power supply and does not need to be wired separately. I/O power supplies and I/O are wired through the I/O MIL connector.

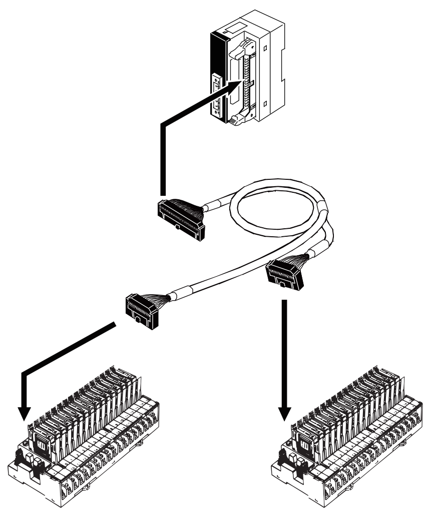
## Connecting to Relay Terminals and Connector-Terminal Block Conversion Units Using OMRON MIL Cables

The MIL Cables and Connector-Terminal Block Conversion Units for connecting OMRON Relay Terminals are shown in the following table. Select the appropriate Cable depending on the combination of Remote I/O Terminals, Relay Terminals, and Connector-Terminal Block Conversion Units that are used.

□D16ML(-1)



□D32ML(-1)



| Slave | MIL Cable | I/O Relay Block or other I/O Terminal | Remarks |
|---|---|---|---|
| DRT2-ID16ML | XW2Z-RI□C | G7TC-ID16<br>G7TC-IA16 | Relay Terminal |
| DRT2-ID16ML-1 | --- | --- | No appropriate model for relay terminals. |
| DRT2-OD16ML | XW2Z-RO□C | G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70D-FOM16/VFOM16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-SOC08 | Relay Terminal |
| DRT2-OD16ML-1 | XW2Z-RI□C | G7TC-OC16-1 | Relay Terminal |
| | XW2Z-RO□C | G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | |
| DRT2-ID16ML<br>DRT2-ID16ML-1<br>DRT2-OD16ML<br>DRT2-OD16ML-1 | XW2Z-RO□C | XW2D-20G6<br>XW2B-20G5<br>XW2B-20G4<br>XW2C-20G6-IO16 | Connector-Terminal Block Conversion Unit |
| DRT2-ID32ML | XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | G7TC-ID16<br>G7TC-IA16 | Relay Terminal |
| DRT2-OD32ML | XW2Z-RO50-25-D1 (50 cm)<br>XW2Z-RO75-50-D1 (75 cm) | G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70D-FOM16/VFOM16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-SOC08 | Relay Terminal |
| DRT2-MD32ML | XW2Z-RM50-25-D1 (50 cm)<br>XW2Z-RM75-50-D1 (75 cm)<br><br>Input tube color: Red<br>Output tube color: Yellow | Inputs: G7TC-ID16<br>G7TC-IA16<br>Outputs: G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-SOC08 | Relay Terminal |

| Slave | MIL Cable | I/O Relay Block or other I/O Terminal | Remarks |
|---|---|---|---|
| DRT2-OD32ML-1 | XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | Relay Terminal |
| | XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | G7TC-OC16-1 | |
| DRT2-MD32ML-1 | XW2Z-RM50-25-D1 (50 cm)<br>XW2Z-RM75-50-D1 (75 cm)<br>Input tube color: Red<br>Output tube color: Yellow | Inputs: G70A-ZIM16-5<br>Outputs: G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | Relay Terminal |
| DRT2-ID32ML<br>DRT2-ID32ML-1<br>DRT2-OD32ML<br>DRT2-OD32ML-1<br>DRT2-MD32ML<br>DRT2-MD32ML-1 | XW2Z-□□□N<br>Cable with Connectors (1:2) | XW2D-20G6 (2 Units)<br>XW2B-20G5 (2 Units)<br>XW2B-20G4 (2 Units)<br>XW2B-20G-IO16 (2 Units) | Connector-Terminal Block Conversion Unit (20 pins) |
| | XW2Z-□□□N<br>Cable with Connector (1:1) | XW2D-40G6<br>XW2B-40G5<br>XW2B-40G4 | Connector-Terminal Block Conversion Unit (40 pins) |

The following cables are also available with a MIL connector on the Remote I/O Terminal end and loose wires on the other end.

| MIL Cable | Remarks |
|---|---|
| XW2Z-RA200C (20 pins, 2 m)<br>XW2Z-RA500C (20 pins, 5 m)<br>XW2Z-RA200C-D1 (40 pins, 2 m)<br>XW2Z-RA500C-D1 (40 pins, 5 m) | Loose wire size: AWG28<br>Loose wires are cut. |
| XW2Z-RY100C (20 pins, 1 m)<br>XW2Z-RY200C (20 pins, 2 m)<br>XW2Z-RY500C (20 pins, 5 m)<br>XW2Z-RY100C-D1 (40 pins, 1 m)<br>XW2Z-RY200C-D1 (40 pins, 2m)<br>XW2Z-RY500C-D1 (40 pins, 5 m) | Forked terminals are attached to the loose wires.<br>Forked terminal: 161071-M2 (Nippon Terminal) |

The MIL pin numbers, loose wire colors, dot markings, and dot colors are listed in the following table.

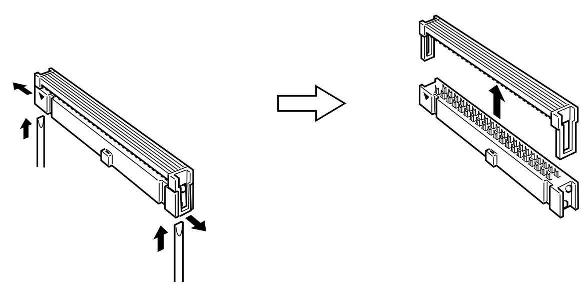
| Pin No. | Core color | Dot marking | Dot color | Pin No. | Core color | Dot marking | Dot color |
|---|---|---|---|---|---|---|---|
| 1 | Light brown | ■ | Black | 21 | Light brown | ■ ■ ■ | Black |
| 2 | | | Red | 22 | | | Red |
| 3 | Yellow | | Black | 23 | Yellow | | Black |
| 4 | | | Red | 24 | | | Red |
| 5 | Light green | | Black | 25 | Light green | | Black |
| 6 | | | Red | 26 | | | Red |
| 7 | Gray | | Black | 27 | Gray | | Black |
| 8 | | | Red | 28 | | | Red |
| 9 | White | | Black | 29 | White | | Black |
| 10 | | | Red | 30 | | | Red |
| 11 | Light brown | ■ ■ | Black | 31 | Light brown | ■ ■ ■ ■ | Black |
| 12 | | | Red | 32 | | | Red |
| 13 | Yellow | | Black | 33 | Yellow | | Black |
| 14 | | | Red | 34 | | | Red |
| 15 | Light green | | Black | 35 | Light green | | Black |
| 16 | | | Red | 36 | | | Red |
| 17 | Gray | | Black | 37 | Gray | | Black |
| 18 | | | Red | 38 | | | Red |
| 19 | White | | Black | 39 | White | | Black |
| 20 | | | Red | 40 | | | Red |

## Using Pressure-welded Flat Cable Connectors

Use the following procedure to prepare flat cables with XG4M-4030-T MIL Connectors.

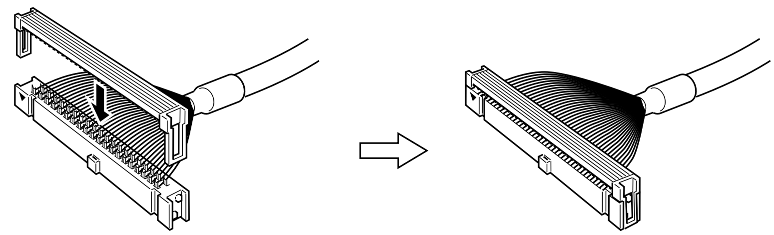
*1,2,3...*

1. Use precision screwdrivers to open the hooks on both ends and separate the contacts from the cover of the MIL socket. There are two tabs on each end of the contact side of the socket. Release both of these at the same time, not one at a time.

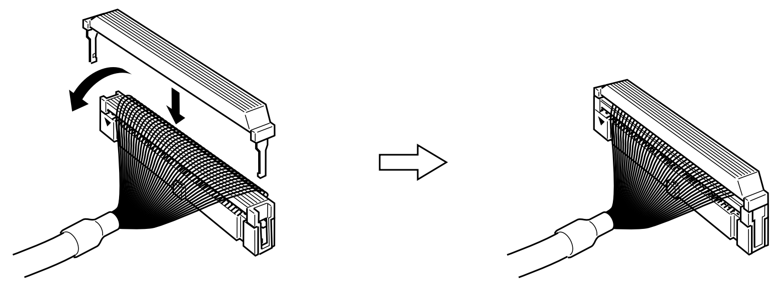


2. Place the flat cable between the contacts and cover of the socket, align the contacts, and press on the cover to lock it in place on the contacts. Use a vise or similar device to firmly press the cover on until the tabs are properly joined.
   Applicable Wires: 1.27-mm pitch flat cable, AWG28 (7-strand wire)

UL2651: Standard Cable, UL20012: Stranded Cable, UL20028: Color Coded Cable



3. If required, fold the back over the connector, and insert and lock a strain relief in place.



4. Connect the MIL Connector to a Remote I/O Terminal with a Connector.

## Using Loose Wires with Pressure-welded Connectors

Use the following parts to prepare cables. The Socket used depends on the wire size.

| Part | Cable wire size: AWG24 | Cable wire size: AWG26 to 26 |
|---|---|---|
| Socket | XG5M-4032-N | XG5M-4035-N |
| Semi-cover (See note 1.) | XG5S-2001 | |
| Hood Cover (See note 2.) | XG5S-4022 | |

**Note**
1. Two Semi-covers are required for each connector.
2. A multi-drop DeviceNet Connector cannot be used if the Hood Cover is used.

Refer to the *PCB Relays Catalog* (X33) for details on the XG5 Loose Wire Pressure-welded Connectors.

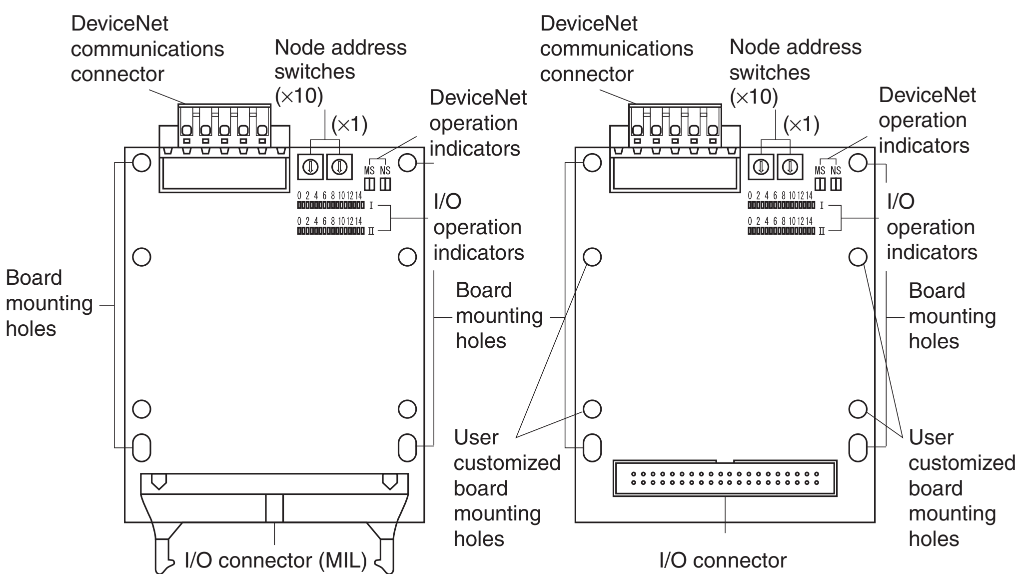
## 5-6-10 Board-type Connector Terminals with 32 Inputs and MIL Connectors: DRT2-ID32B (NPN)/DRT2-ID32B-1 (PNP) and DRT2-ID32BV (NPN)/DRT2-ID32BV-1 (PNP)

### Input Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-ID32B<br>DRT2-ID32BV | DRT2-ID32B-1<br>DRT2-ID32BV-1 |
| Internal I/O common | NPN | PNP |
| Input points | 32 points | |
| ON voltage | 17 V DC min. (between each input terminal and V) | 17 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max. at 24 V DC<br>3.0 mA min. at 17 V DC<br>(between each input terminal and V terminal) | 6.0 mA max. at 24 V DC<br>3.0 mA min. at 17 V DC<br>(between each input terminal and G terminal) |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Max. simultaneously ON input points | 32 points | |
| Number of circuits | 32 points with one common circuit | |

### Components

**DRT2-ID32B (NPN)/DRT2-ID32B-1 (PNP)** **DRT2-ID32BV (NPN)/DRT2-ID32BV-1 (PNP)**



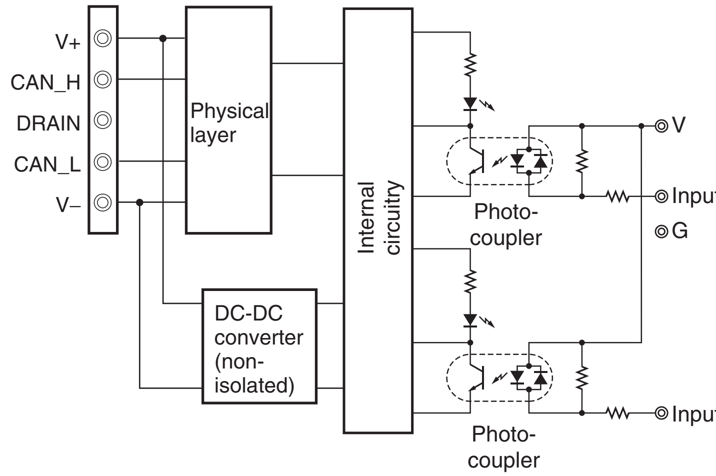

#### Input Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when input is ON; not lit when input is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word m+1. Lit when input is ON; not lit when input is OFF. |

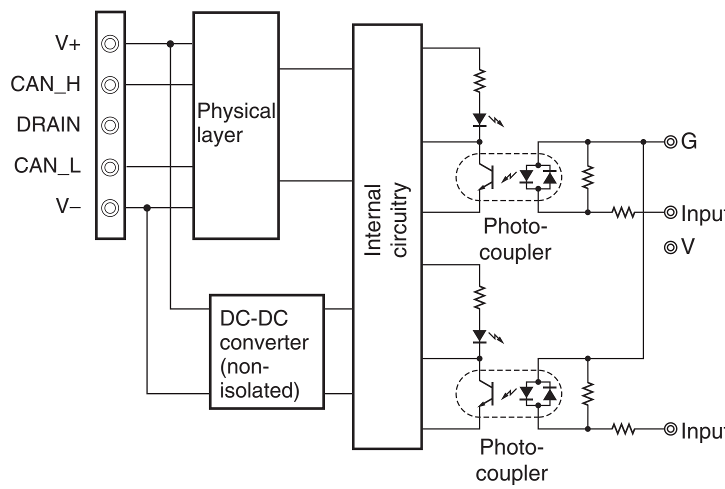
**Note** “m” is the first word allocated to the Remote I/O Terminal.

## Internal Circuits

### DRT2-ID32B and DRT2-ID32BV (NPN)

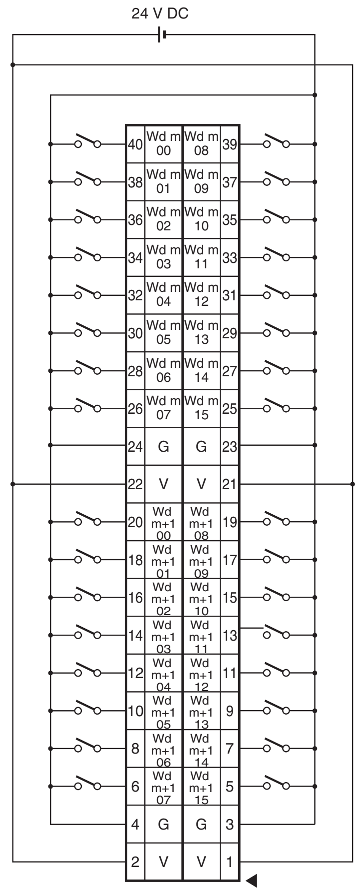



### DRT2-ID32B-1 and DRT2-ID32BV-1 (PNP)

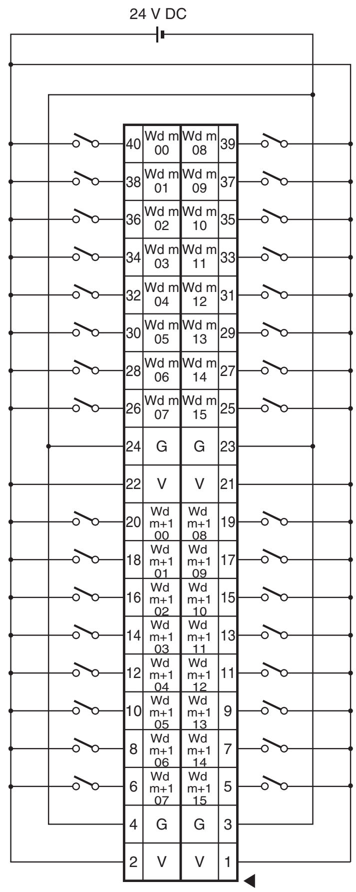


## Wiring

### DRT2-ID32B and DRT2-ID32BV (NPN)



**DRT2-ID32B-1 and DRT2-ID32BV-1 (PNP)**




**Note**
1. V terminals are connected internally, as are the G terminals. Connect them carefully.
2. Wire the V terminals and G terminals correctly so that the following functions operate properly.
   - I/O Power Status Monitor
   - Contact Operation Counter
   - Total ON Time Monitor
   - Function preventing malfunction caused by inrush current at startup.

   If these functions are not being used, input signals will be received even if the G terminals of the DRT2-ID32B and DRT2-ID32BV or V terminals of the DRT2-ID32B-1 and DRT2-ID32BV-1 are not connected.

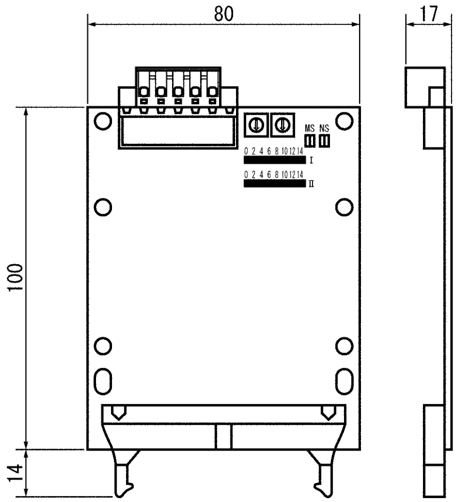
## I/O Allocations

The first word allocated to the Remote I/O Terminal is referred to as “word m.” Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

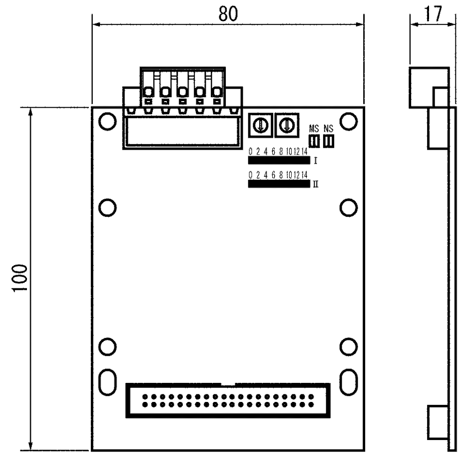
| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 inputs |
| Wd m+1 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 inputs |

## Dimensions

**DRT2-ID32B (NPN)/DRT2-ID32B-1 (PNP)**




**DRT2-ID32BV (NPN)/DRT2-ID32BV-1**




# 5-6-11 Board-type Connector Terminals with 32 Outputs and MIL Connectors: DRT2-OD32B (NPN)/DRT2-OD32B-1 (PNP) and DRT2-OD32BV (NPN)/DRT2-OD32BV-1 (PNP)

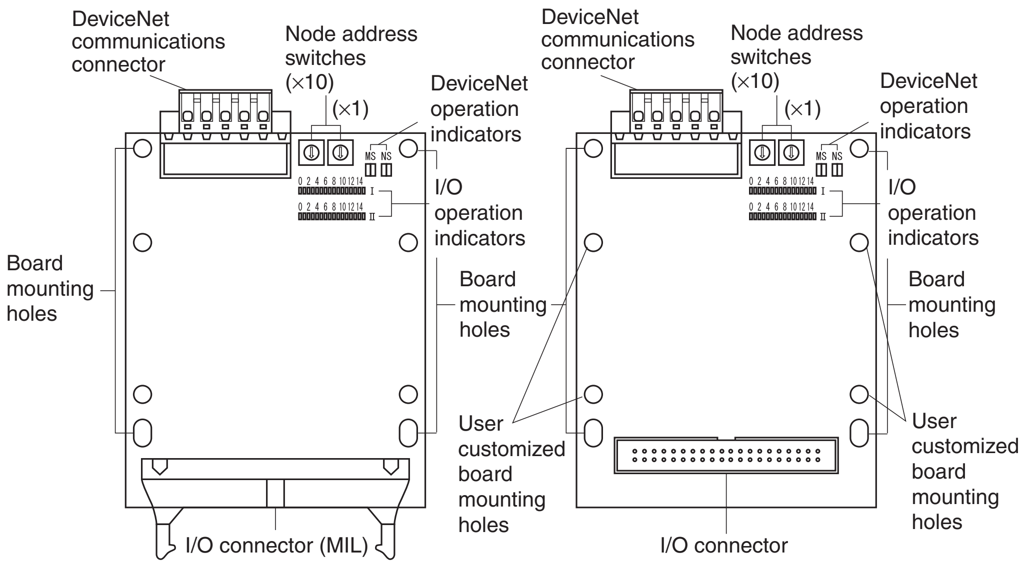
## Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-OD32B<br>DRT2-OD32BV | DRT2-OD32B-1<br>DRT2-OD32BV-1 |
| Internal I/O common | NPN | PNP |
| Output points | 32 points | |
| Rated output current | 0.3 A/point, 4 A/common (See note.) | |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 32 points with one common circuit | |

**Note** Do not allow the total load current to exceed 4 A and do not allow the load current on either the V or G terminal to exceed 1 A.

## Components

**DRT2-OD32B (NPN)/DRT2-OD32B-1 (PNP)  DRT2-OD32BV (NPN)/DRT2-OD32BV-1 (PNP)**



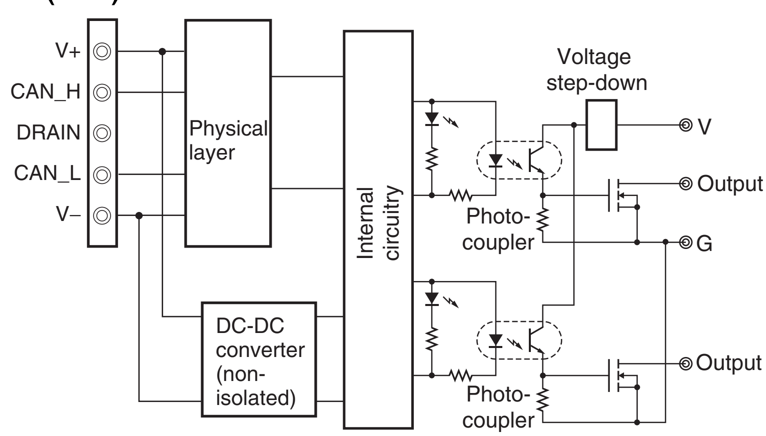

### Output Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when output is ON; not lit when output is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word m+1. Lit when output is ON; not lit when output is OFF. |

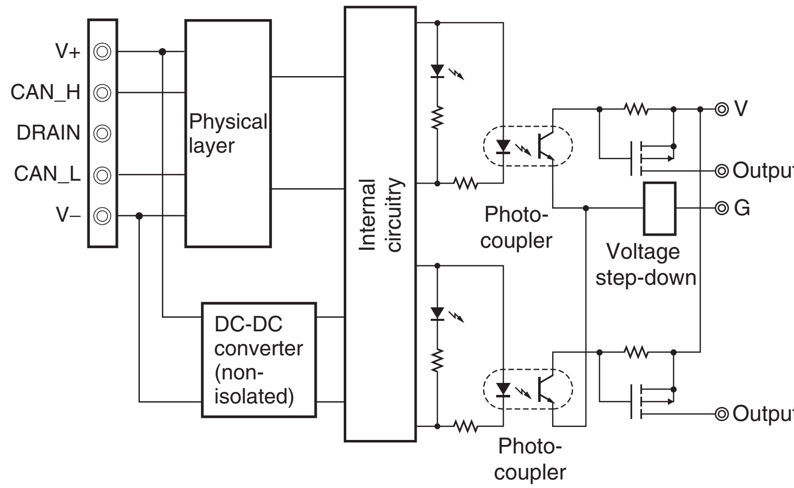
**Note** “m” is the first word allocated to the Remote I/O Terminal.

## Internal Circuits

### DRT2-OD32B and DRT2-OD32BV (NPN)

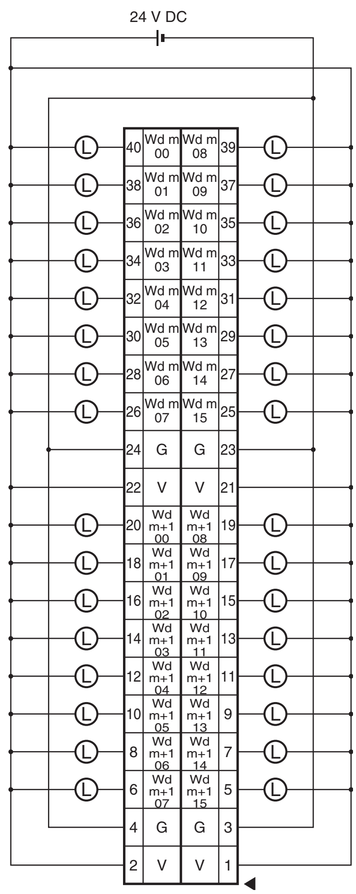


### DRT2-OD32B-1 and DRT2-OD32BV-1 (PNP)

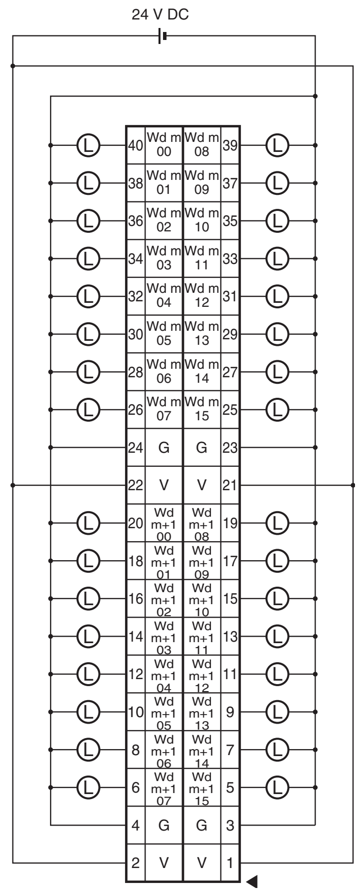



## Wiring

### DRT2-OD32B and DRT2-OD32BV (NPN)



### DRT2-OD32B-1 and DRT2-OD32BV-1 (PNP)



**Note**

1. The V terminals are connected internally, as are the G terminals. When the power supply exceeds 1.0 A per terminal or the total current drawn by the external loads exceeds 4 A, the output power supply should not be input through the terminals; an external power supply must be used instead.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)

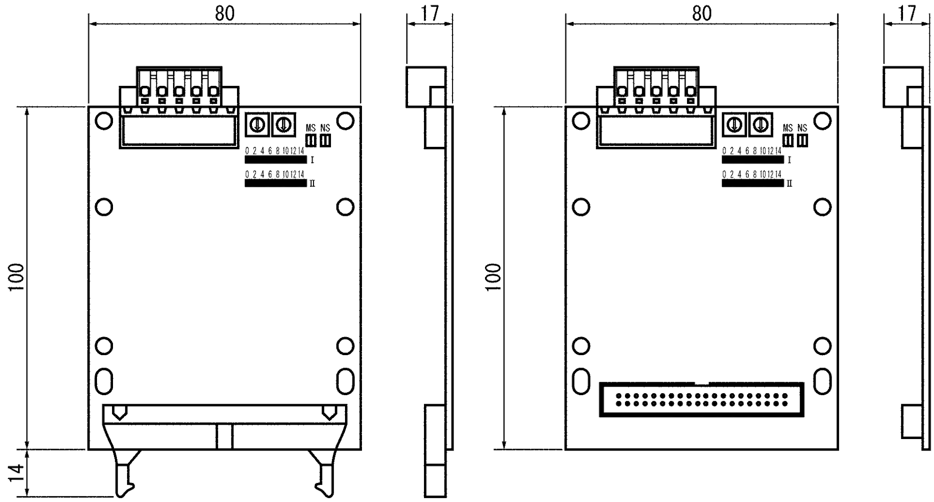
**I/O Allocations**

The first word allocated to the Remote I/O Terminal is referred to as "word m." Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 outputs |
| Wd m+1 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 outputs |

## Dimensions

**DRT2-OD32B (NPN)/DRT2-OD32B-1 (PNP) DRT2-OD32BV (NPN)/DRT2-OD32BV-1 (PNP)**




## 5-6-12 Board-type Connector Terminals with 16 Inputs, 16 Outputs and MIL Connectors: DRT2-MD32B (NPN)/DRT2-MD32B-1 (PNP) and DRT2-MD32BV (NPN)/DRT2-MD32BV-1 (PNP)

### Input Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-MD32B<br>DRT2-MD32BV | DRT2-MD32B-1<br>DRT2-MD32BV-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 17 V DC min. (between each input terminal and V) | 17 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1.0 mA max. | |
| Input current | 6.0 mA max. at 24 V DC<br>3.0 mA min. at 17 V DC<br>(between each input terminal and V terminal) | 6.0 mA max. at 24 V DC<br>3.0 mA min. at 17 V DC<br>(between each input terminal and G terminal) |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Max. No. of ON inputs | 16 points | |
| Number of circuits | 16 points with one common circuit | |

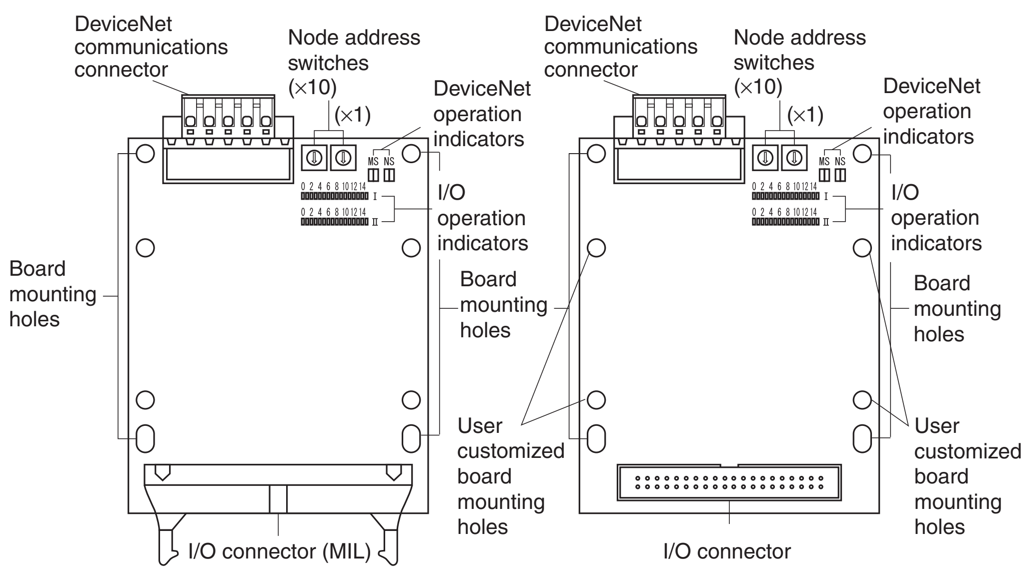
## Output Specifications

| Item | Specification | |
|---|---|---|
| Model | DRT2-MD32B<br>DRT2-MD32BV | DRT2-MD32B-1<br>DRT2-MD32BV-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.3 A/point, 2 A/common (See note.) | |
| Residual voltage | 1.2 V max. (at 0.3 A, between each output terminal and G) | 1.2 V max. (at 0.3 A, between each output terminal and V) |
| Leakage current | 0.1 mA max. | 0.1 mA max. |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common circuit | |

**Note** Do not allow the total load current to exceed 2 A and do not allow the load current on either the V or G terminal to exceed 1 A.

## Components

**DRT2-MD32B (NPN)/DRT2-MD32B-1 (PNP) DRT2-MD32BV (NPN)/DRT2-MD32BV-1 (PNP)**



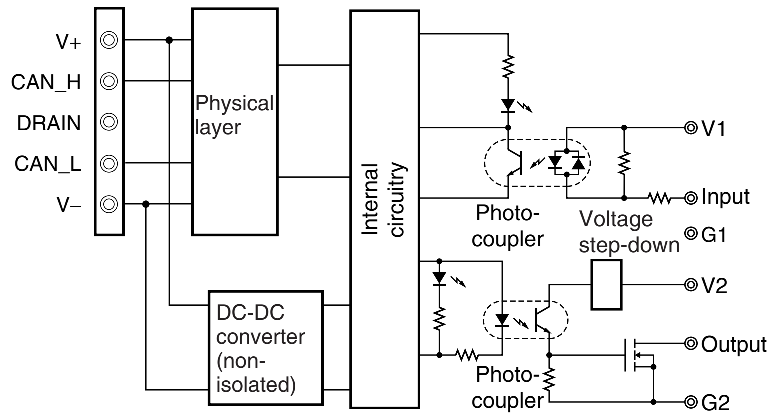

### I/O Indicators

| Name | Meaning |
|---|---|
| I0 to I15 | Indicate the status of bits (contacts) 0 to 15 in word m. Lit when input is ON; not lit when input is OFF. |
| II0 to II15 | Indicate the status of bits (contacts) 0 to 15 in word n. Lit when output is ON; not lit when output is OFF. |

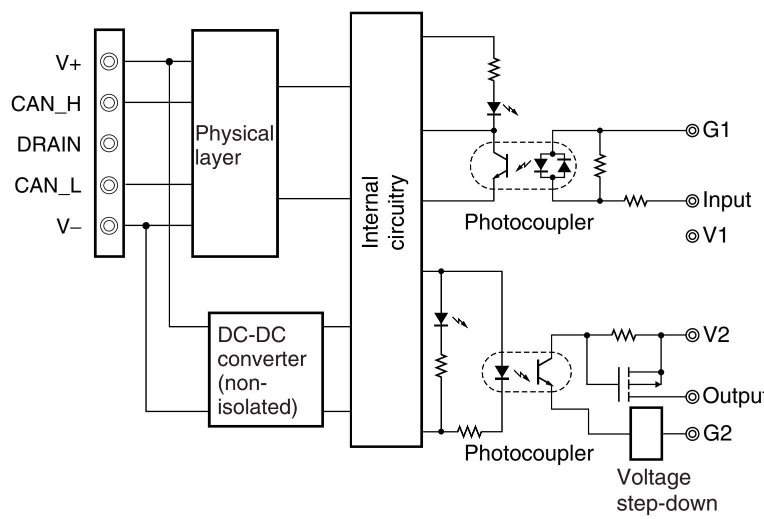
**Note** m: The first word allocated for the Remote I/O Terminal's IN Area.
n: The first word allocated for the Remote I/O Terminal's OUT Area.

## Internal Circuits

### DRT2-MD32B and DRT2-MD32BV (NPN)

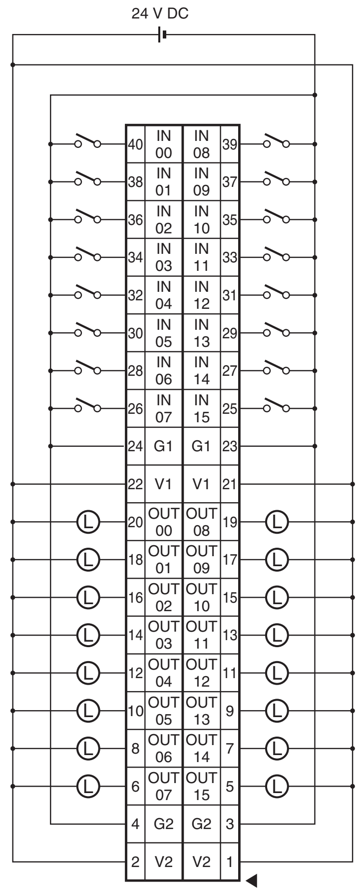



### DRT2-MD32B-1 and DRT2-MD32BV-1 (PNP)

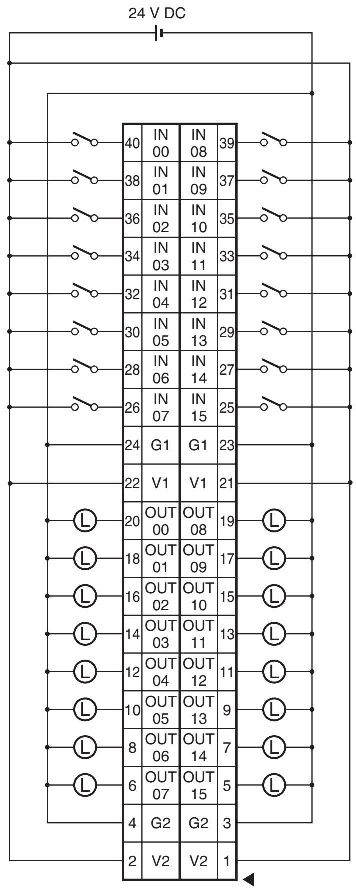


## Wiring

### DRT2-MD32B and DRT2-MD32BV (NPN)



#### DRT2-MD32B-1 and DRT2-MD32BV-1 (PNP)




**Note**

1. The V1 terminals are connected internally, as are the V2 terminals, the G1, and the G2 terminals. (V1 is not connected to V2 and G1 is not connected to G2.) When the power supply exceeds 1.0 A per terminal or the total current drawn by the external loads exceeds 2 A, the output power supply should not be input through the terminals; an external power supply must be used instead.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Wire the V1 terminals and G1 terminals correctly so that the following functions operate properly.
   - I/O Power Status Monitor
   - Contact Operation Counter
   - Total ON Time Monitor
   - Function preventing malfunction caused by inrush current at startup.

   If these functions are not being used, input signals will be received even if the G1 terminals of the DRT2-MD32B/DRT2-MD32BV or V1 terminals of the DRT2-MD32B-1/DRT2-MD32BV-1 are not connected.

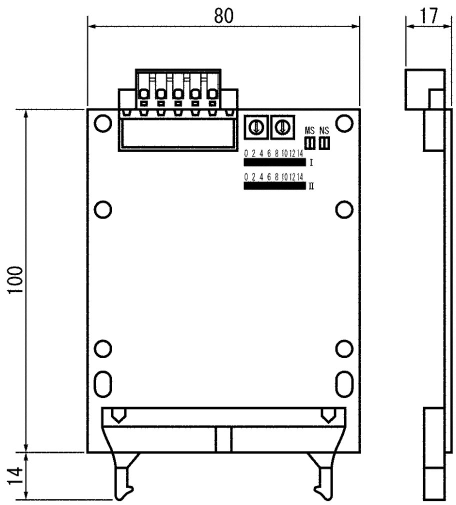
**I/O Allocations**

The input word and output word allocated to the Remote I/O Terminal are referred to as “word m” and “word n” respectively. Given this, the bit and word allocations to MIL connector pin numbers are as shown in the following diagram.

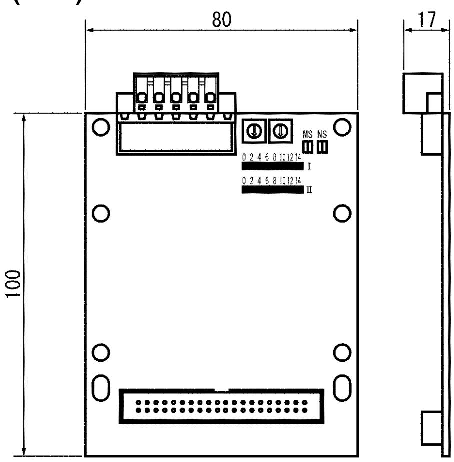
| Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wd m | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 16 inputs |
| Wd n | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 16 outputs |

## Dimensions

**DRT2-MD32B (NPN)/DRT2-MD32B-1 (PNP)**

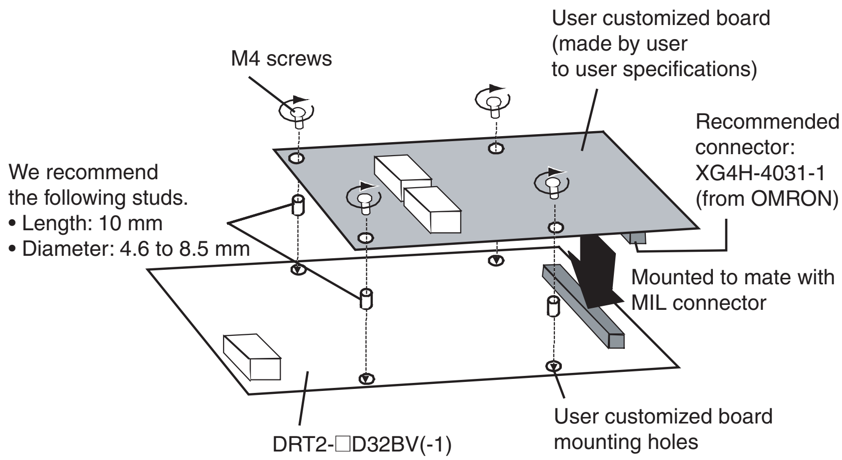



**DRT2-MD32BV (NPN)/DRT2-MD32BV-1 (PNP)**



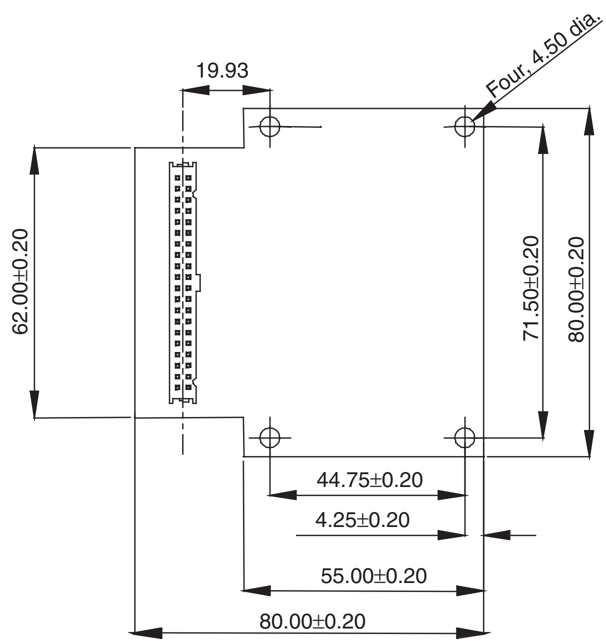
## User Customized Boards

A board can be created by the user and mounted to the DRT2-□D32BV(-1). This allows the user to create the required I/O system by placing I/O connectors, relays, and other components as necessary on the board and then mounting the board to a Board Terminal. The following diagram illustrates mounting a customized user board to the DRT2-□D32BV(-1).




### User Customized Board Dimensions

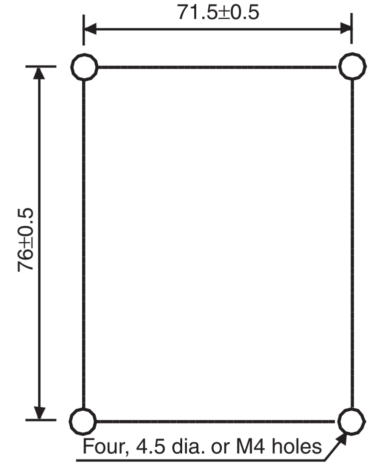
Cut the user customized board to the dimensions shown below.



## Mounting

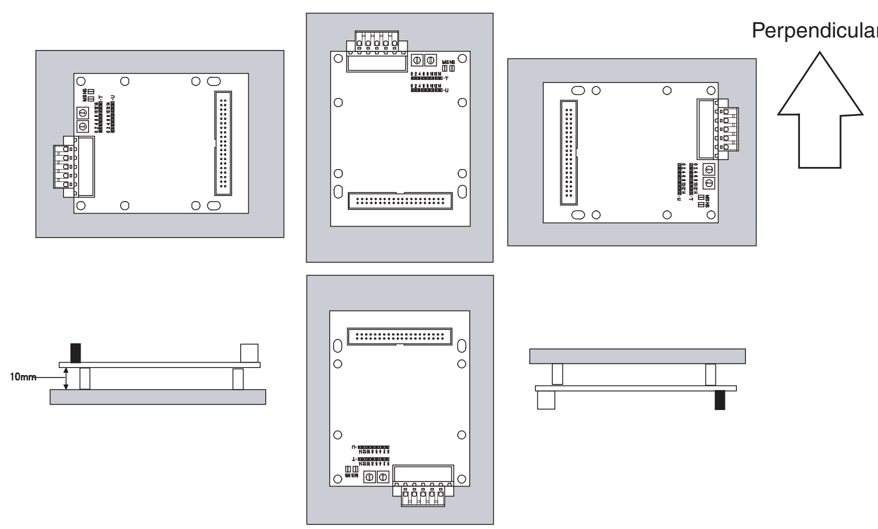
The DRT2-□D32B/BV is mounted to the control panel using screws. It cannot be mounted to DIN Track. Use M4 mounting screws and mount the board using spacers.

### Mounting Dimensions




### Mounting Direction

There are no restrictions to the mounting direction. The board can be mounted in any of the following six directions. The DRT2-□D32BV(-1) is shown in the following diagram.

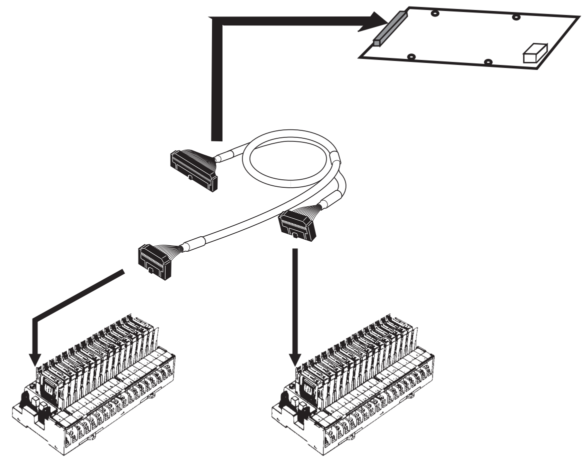



## Wiring Internal Power Supplies, I/O Power Supplies and I/O

Internal power is supplied together with the communications power supply and does not need to be wired separately. I/O power supplies and I/O are wired through the I/O MIL connector.

## Connecting to I/O Terminals Using OMRON MIL Cables

The MIL Cables listed in the following table are available to connect OMRON I/O Terminals (e.g., I/O Relay Blocks). Select the MIL Cable that matches the Remote I/O Terminal and the I/O Terminal.



| Slave | MIL Cable | I/O Relay Block or other I/O Terminal | Remarks |
|---|---|---|---|
| DRT2-ID32B | XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | G7TC-ID16<br>G7TC-IA16 | --- |
| DRT2-OD32B | XW2Z-RO50-25-D1 (50 cm)<br>XW2Z-RO75-50-D1 (75 cm) | G7TC-OC08/OC16<br>G70D-SOC16/VSOC16<br>G70A-ZOC16-3<br>G70D-FOM16/VFOM16 | --- |
| DRT2-MD32B | XW2Z-RM50-25-D1 (50 cm)<br>XW2Z-RM75-50-D1 (75 cm) | Inputs: G7TC-ID16/IA16<br>Outputs: G7TC-OC08/OC16<br>G70D-SOC16/VSOC16<br>G70A-ZOC16-3 | I/O are distinguished by color.<br>Input tube color: Red<br>Output tube color: Yellow |
| DRT2-ID32B-1 | XW2Z-RI50-25-D2 (50 cm)<br>XW2Z-RI75-50-D2 (75 cm) | G70A-ZIM16-5 | --- |
| DRT2-OD32B-1 | XW2Z-RO50-25-D1 (50 cm)<br>XW2Z-RO75-50-D1 (75 cm) | G70A-ZOC16-4<br>G70D-SOC16-1 | --- |
| | XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | G7TC-OC16-4<br>M7F | --- |
| DRT2-MD32B-1 | XW2Z-RM50-25-D2 (50 cm)<br>XW2Z-RM75-50-D2 (75 cm) | Inputs: G70A-ZIM16-5<br>Outputs: G70A-ZOC16-4<br>G70D-SOC16-1 | I/O are distinguished by color.<br>Input tube color: Red<br>Output tube color: Yellow |

The following cables are also available with a MIL connector on the Remote I/O Terminal end and loose wires on the other end.

| MIL Cable | Remarks |
|---|---|
| XW2Z-RA200C-D1 (2 m)<br>XW2Z-RA500C-D1 (5 m) | Loose wire size: AWG28<br>Loose wires are cut. |
| XW2Z-RY100C-D1 (1 m)<br>XW2Z-RY200C-D1 (2 m)<br>XW2Z-RY500C-D1 (5 m) | Forked terminals are attached to the loose wires.<br>Forked terminals: 161071-M2 (Nippon Terminal) |

The MIL pin numbers, loose wire colors, dot markings, and dot colors are listed in the following table.

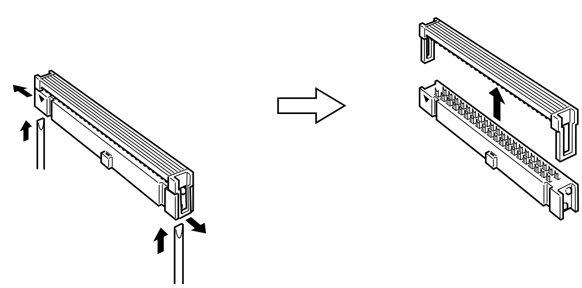
| Pin No. | Core color | Dot marking | Dot color | Pin No. | Core color | Dot marking | Dot color |
|---|---|---|---|---|---|---|---|
| 1 | Light brown | ■ | Black | 21 | Light brown | ■■■ | Black |
| 2 | | | Red | 22 | | | Red |
| 3 | Yellow | | Black | 23 | Yellow | | Black |
| 4 | | | Red | 24 | | | Red |
| 5 | Light green | | Black | 25 | Light green | | Black |
| 6 | | | Red | 26 | | | Red |
| 7 | Gray | | Black | 27 | Gray | | Black |
| 8 | | | Red | 28 | | | Red |
| 9 | White | | Black | 29 | White | | Black |
| 10 | | | Red | 30 | | | Red |
| 11 | Light brown | ■■ | Black | 31 | Light brown | ■■■■ | Black |
| 12 | | | Red | 32 | | | Red |
| 13 | Yellow | | Black | 33 | Yellow | | Black |
| 14 | | | Red | 34 | | | Red |
| 15 | Light green | | Black | 35 | Light green | | Black |
| 16 | | | Red | 36 | | | Red |
| 17 | Gray | | Black | 37 | Gray | | Black |
| 18 | | | Red | 38 | | | Red |
| 19 | White | | Black | 39 | White | | Black |
| 20 | | | Red | 40 | | | Red |

## Using Pressure-welded Flat Cable Connectors

Use the following procedure to prepare flat cables with XG4M-4030-T MIL Connectors.

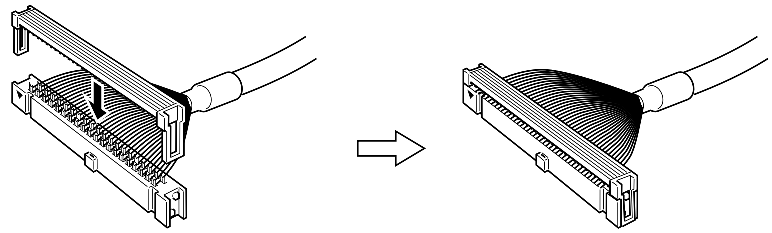
***1,2,3...***

1. Use precision screwdrivers to open the hooks on both ends and separate the contacts from the cover of the MIL socket. There are two tabs on each end of the contact side of the socket. Release both of these at the same time, not one at a time.

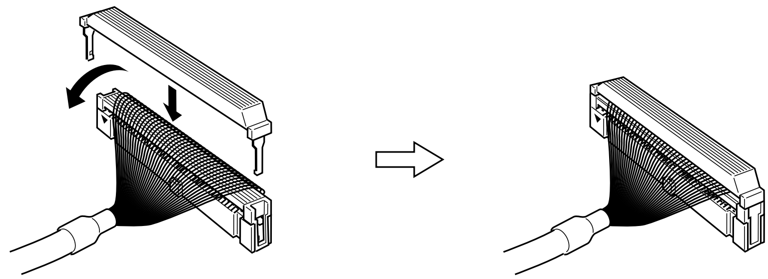


2. Place the flat cable between the contacts and cover of the socket, align the contacts, and press on the cover to lock it in place on the contacts. Use a vise or similar device to firmly press the cover on until the tabs are properly joined.
   Applicable Wires: 1.27-mm pitch flat cable, AWG28 (7-strand wire)

UL2651: Standard Cable, UL20012: Stranded Cable, UL20028: Color Coded Cable



3. If required, fold the back over the connector, and insert and lock a strain relief in place.



4. Connect the MIL Connector to a Remote I/O Terminal with a Connector.

## Using Loose Wires with Pressure-welded Connectors

Use the following parts to prepare cables. The Socket used depends on the wire size.

| Part | Cable wire size: AWG24 | Cable wire size: AWG26 to 26 |
|---|---|---|
| Socket | XG5M-4032-N | XG5M-4035-N |
| Semi-cover (See note 1.) | XG5S-2001 | |
| Hood Cover (See note 2.) | XG5S-4022 | |

**Note**

1. Two Semi-covers are required for each connector.
2. A multi-drop DeviceNet Connector cannot be used if the Hood Cover is used.

Refer to the *PCB Relays Catalog* (Cat. No. X33) for details on the XG5 Loose Wire Pressure-welded Connectors.

# 5-7 Screw-less Clamp Terminals

The Screw-less Clamp Terminal has a structure designed for clamping to a terminal block. It is a reduced-wiring, labor-saving Slave that can make wiring easy by simply inserting post terminals (sleeves). The Unit and terminal block can be detached, making it possible to replace the Unit in the event of a failure without removing the wiring.

There are two categories of Screw-less Clamp Terminals: Those that have detection functions for early detection of errors, and those that do not.

**Models without Detection Functions**

| Model | Specifications |
|---|---|
| DRT2-ID16SL(-1) | 16 inputs |
| DRT2-ID32SL(-1) | 32 inputs |
| DRT2-MD32SL(-1) | 16 inputs/16 outputs |
| DRT2-OD16SL(-1) | 16 outputs |
| DRT2-OD32SL(-1) | 32 outputs |

**Models With Detection Functions**

| Model | Specifications |
|---|---|
| DRT2-ID16SLH(-1) | 16 inputs |
| DRT2-ID32SLH(-1) | 32 inputs |
| DRT2-MD32SLH(-1) | 16 inputs/16 outputs |
| DRT2-OD16SLH(-1) | 16 outputs |
| DRT2-OD32SLH(-1) | 32 outputs |

## 5-7-1 Node Address, Baud Rate, and Output Hold/Clear Settings

These settings are made in the same way as for Remote I/O Terminals (Transistor Type). Refer to *5-5-1 Node Address, Baud Rate, and Output Hold/Clear Settings*.

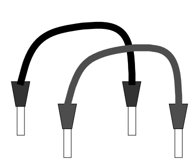
## 5-7-2 Wiring to a Screw-less Clamp Terminal Block

Screw-less Clamp Terminals provide clamp-type terminal blocks that allow wiring without screws. When connecting a sensor or an external device, a special post terminal must be attached to the cable for the sensor or device.

| Manufacturer | Model | |
|---|---|---|
| PHOENIX CONTACT | AI-0.5-10 | 0.5 mm$^2$ (AWG 20) |
| | AI-0.75-10 | 0.75 mm$^2$ (AWG 18) |
| | AI-1.5-10 | 1.25 mm$^2$ (AWG 16) |
| Nihon Weidmuller | H 0.5/16 D | 0.5 mm$^2$ (AWG 20) |
| | H 0.75/16 D | 0.75 mm$^2$ (AWG 18) |
| | H 1.5/16 D | 1.25 mm$^2$ (AWG 16) |

**Power Supply Wiring**

Two cables are provided with the DRT2-□D32SL(-1) and DRT2-□D32SLH(-1) Terminals for V and G, to transfer power between terminal blocks. Use these cables when there is no need to divide the power by block. The rated current is 10 A max.



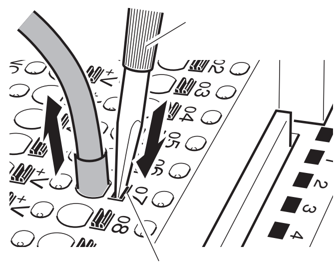
## Wiring to a Clamp Terminal Block

**Insertion**

Insert the post terminal all the way to the end in any terminal hole.

**Removal**

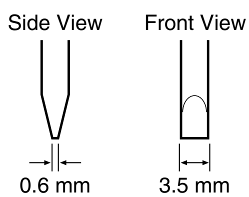
Pull out the power line while pressing down with a small flat-blade screwdriver on the release button above the terminal hole.



The following screwdriver is recommended for use when removing cables.

**Recommended Screwdriver Model**

| Model | Manufacturer |
|---|---|
| SZF1 | PHOENIX CONTACT |



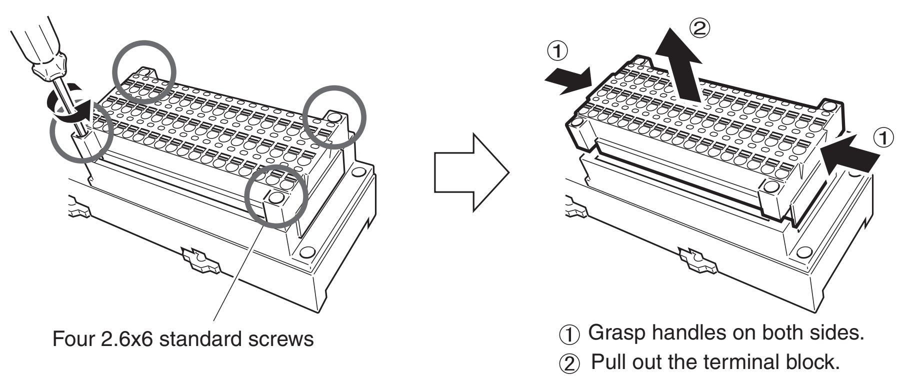

## Removing and Mounting a Clamp Terminal Block

**Removal**

Use a flat-blade screwdriver to loosen the four screws on the top of the terminal block, and then grasp the handles on both sides and remove the terminal block.

**Mounting**

Grasp the handles on both sides of the terminal block, and insert the terminal block firmly in place. Then use a flat-blade screwdriver to tighten the four screws on the top of the terminal block.




**Note** Tighten the screws to a torque of 0.2 to 0.25 N·m.

## 5-7-3 I/O Indicators

The I/O indicators show the ON/OFF status of inputs and outputs and the error status of connected devices.

| Indicator name | Status | Color | Meaning (main error) |
|---|---|---|---|
| 0 to 15<br>(Display for each contact) | | Yellow | Lit when input or output is ON. |
| | | Red | Lit when error is detected.<br>Output: External load disconnection<br>Input: Sensor disconnection<br>Clear as follows:<br>Output: For manual recovery, clear error and then restart. For automatic recovery, clear error.<br>Input: Clear error. |
| | | Red | Lit when error is detected.<br>Output: External load short-circuit (for DRT2-OD16SLH(-1) only)<br>Input: Sensor power supply short-circuit<br>Clear as follows:<br>Output: For manual recovery, clear error and then restart. For automatic recovery, clear error.<br>Input: Clear error. |
| | | OFF | Lit when input or output is OFF. |
| I/O | | Green | I/O power is being supplied. |
| | | OFF | I/O power is not being supplied. |

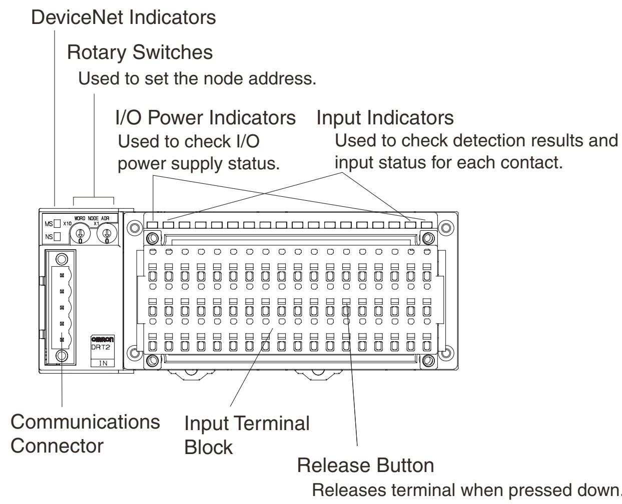
## 5-7-4 Screw-less Clamp Terminals with 16 Transistor Inputs

### Input Specifications

| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-ID16SL | DRT2-ID16SL-1 | DRT2-ID16SLH | DRT2-ID16SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Input points | 16 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Input current | 6.0 mA max./point at 24 V DC, 3.0 mA min./point at 17 V DC | | | |
| Input resistance | 4 kΩ | | | |
| ON delay time | 1.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| ON current | 3 mA min. | | | |
| OFF current | 1 mA max. | | | |
| Number of circuits | 16 points with one common | | | |
| Power supply short-circuit protection | --- | | Operates at 50 mA/pt. min. | |

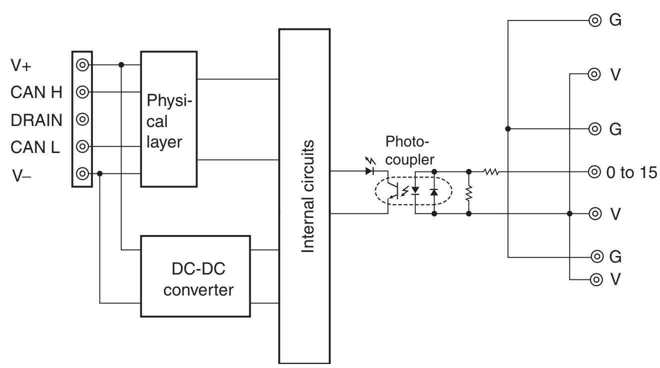
| Item | Specification | |
|---|---|---|
| Disconnection detection | --- | Operates at 0.3 mA/pt. max. |
| Current supplied to input devices | 100 mA/input | 50 mA/input |

## Component Names and Functions (Same for DRT2-ID16SL(-1) and DRT2-ID16SLH(-1))

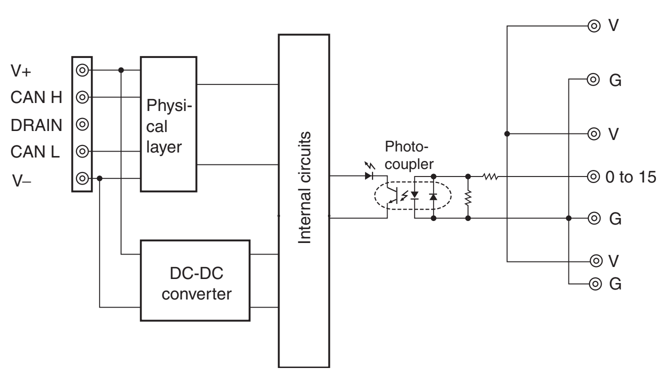



## Internal Circuits

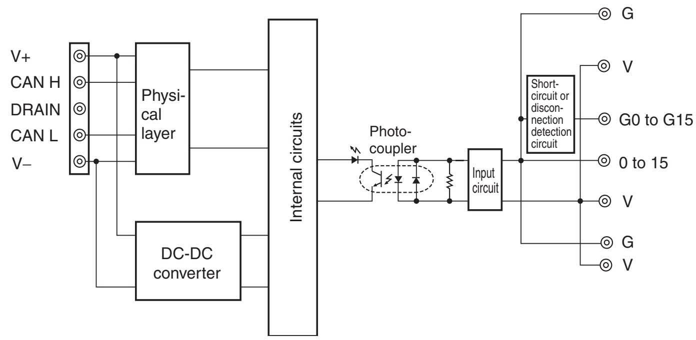
### DRT2-ID16SL (NPN)



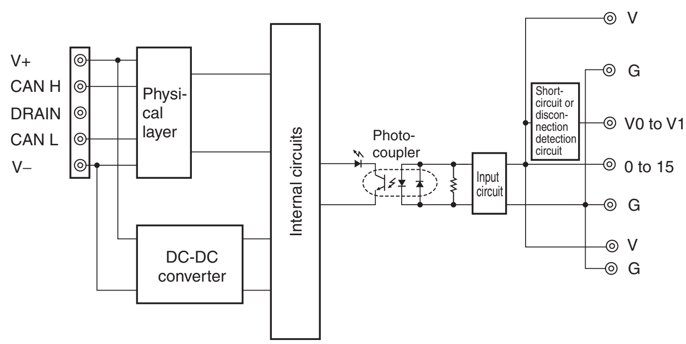

### DRT2-ID16SL-1 (PNP)



### DRT2-ID16SLH (NPN)

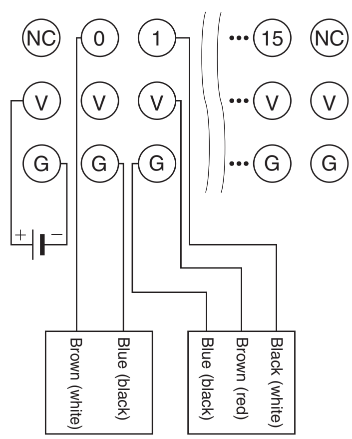



### DRT2-ID16SLH-1 (PNP)

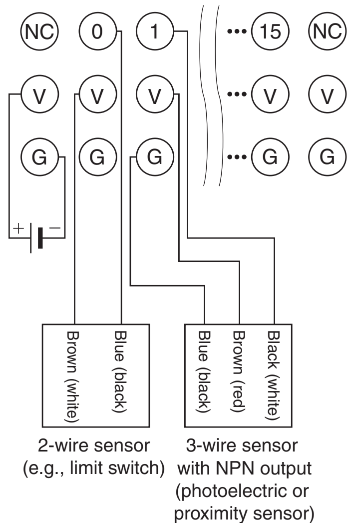



## Wiring

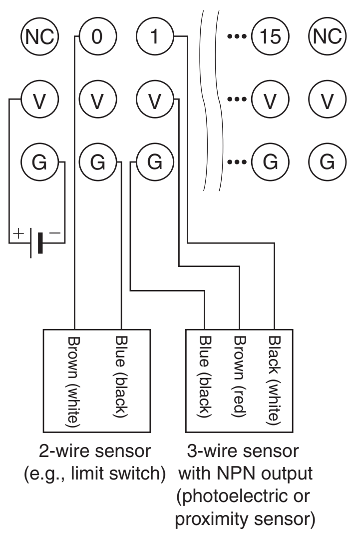
### DRT2-ID16SL (NPN)



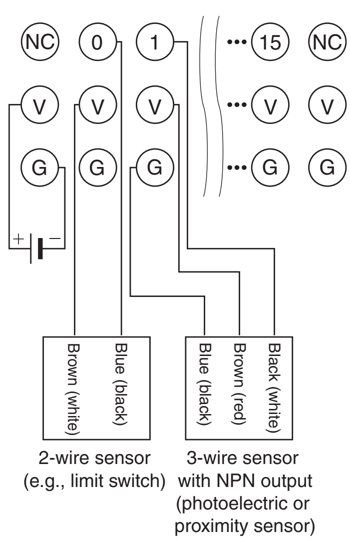
**DRT2-ID16SL-1 (PNP)**




**DRT2-ID16SLH (NPN)**

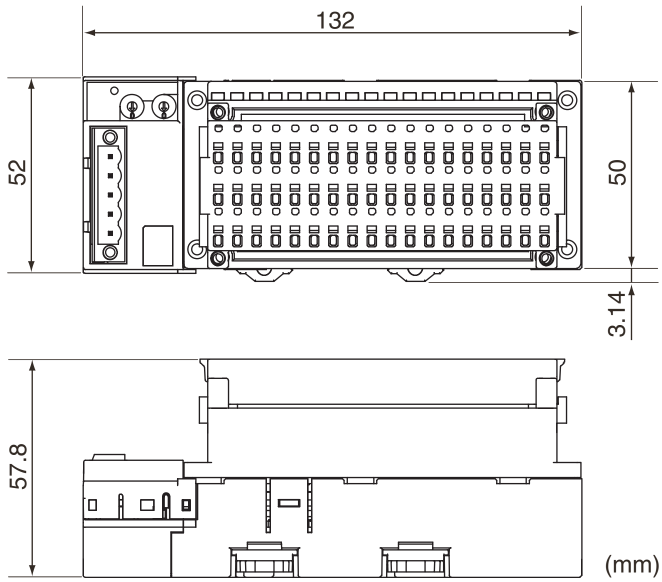



**DRT2-ID16SLH-1 (PNP)**



**Note** Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

## Dimensions (Same for DRT2-ID16SL(-1) and ID16SLH(-1))

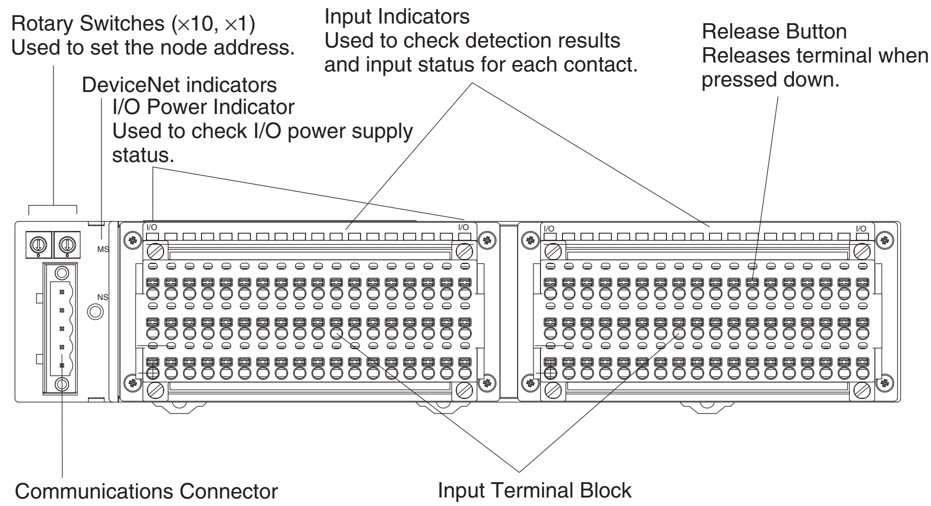



# 5-7-5 Screw-less Clamp Terminals with 32 Transistor Inputs

## Input Specifications

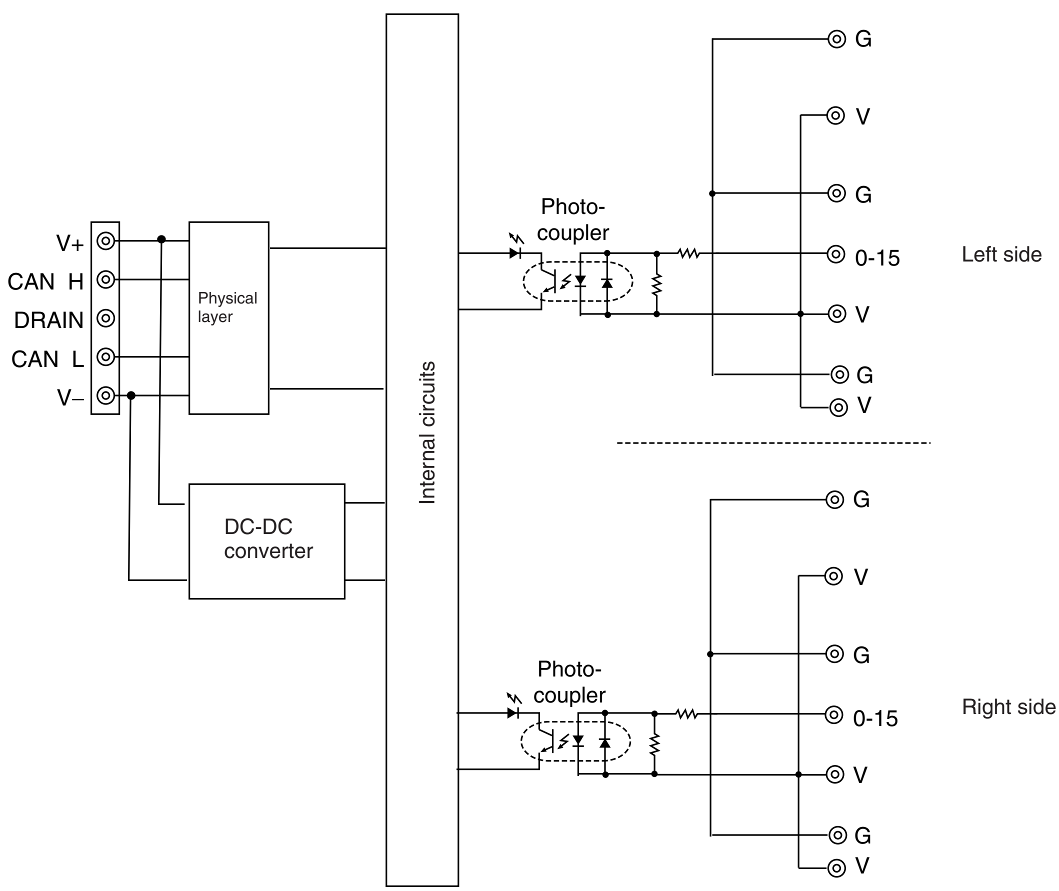
| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-ID32SL | DRT2-ID32SL-1 | DRT2-ID32SLH | DRT2-ID32SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Input points | 32 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Input current | 6.0 mA max./point at 24 V DC, 3.0 mA min./point at 17 V DC | | | |
| Input resistance | 4 kΩ | | | |
| ON delay time | 1.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| ON current | 3 mA min. | | | |
| OFF current | 1 mA max. | | | |
| Number of circuits | 16 points with one common | | | |
| Power supply short-circuit protection | --- | | Operates at 50 mA/pt. min. | |
| Disconnection detection | --- | | Operates at 0.3 mA/pt. max. | |
| Current supplied to input devices | 100 mA/input | | 50 mA/input | |

## Component Names and Functions (Same for DRT2-ID32SL(-1) and DRT2-ID32SLH(-1))

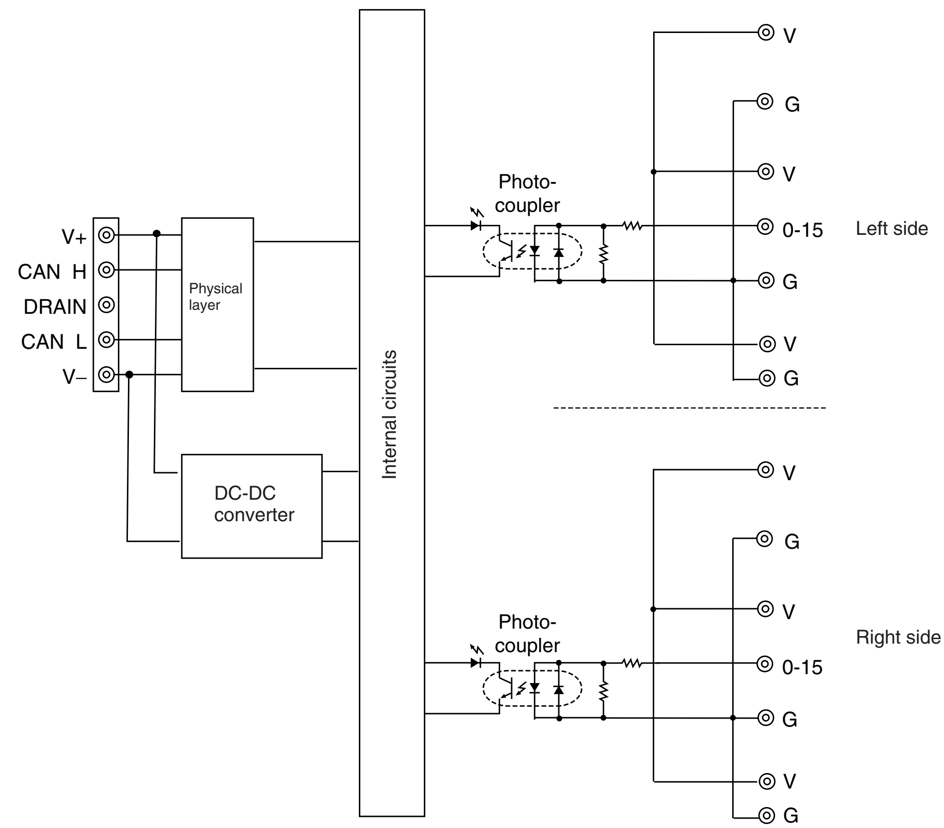



## Internal Circuits

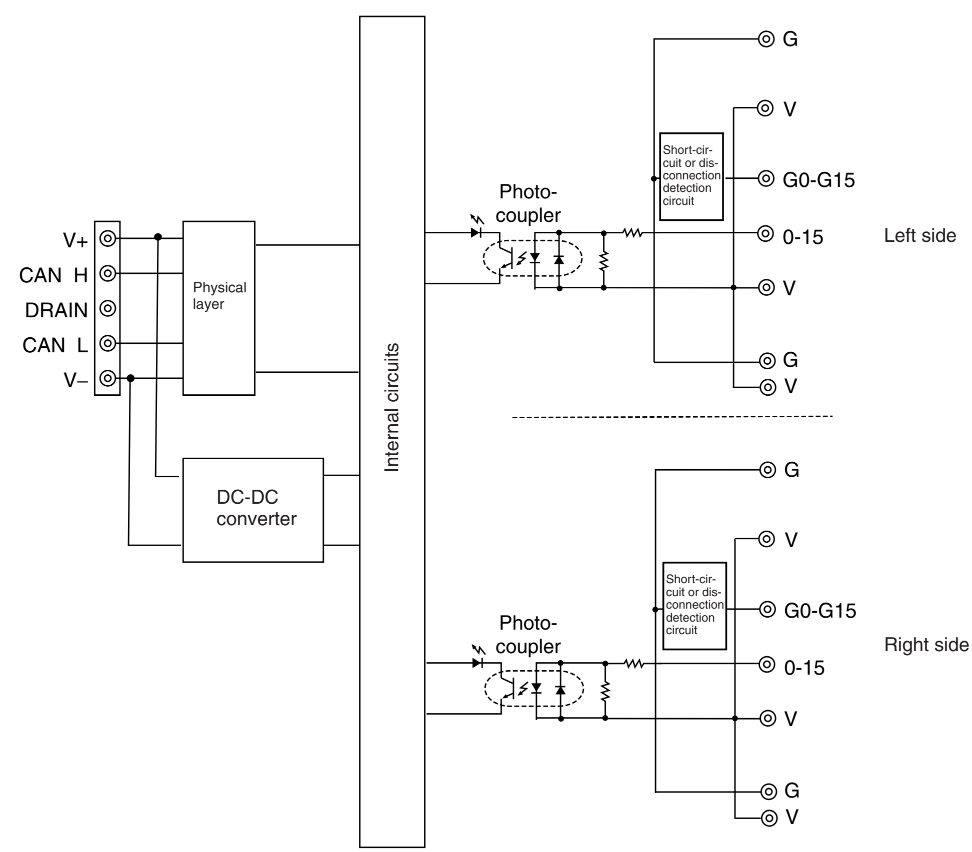
### DRT2-ID32SL



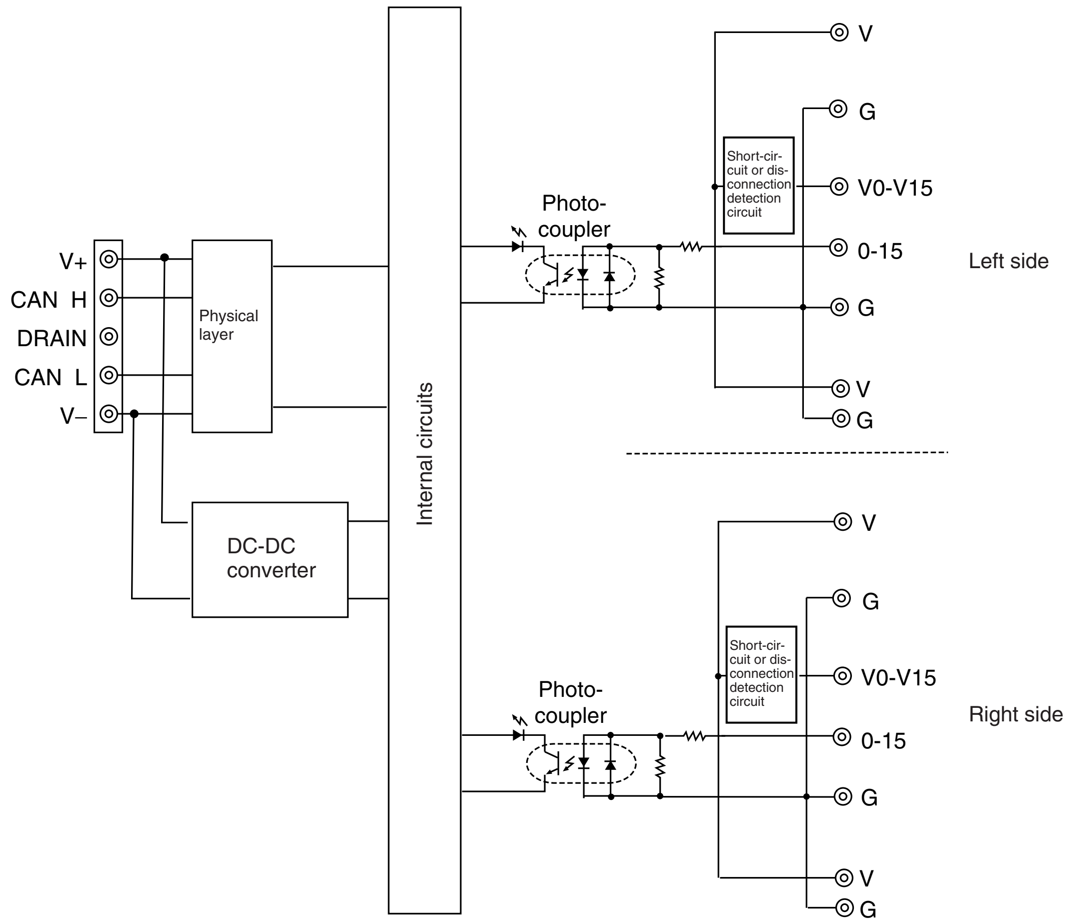
### DRT2-ID32SL-1




### DRT2-ID32SLH

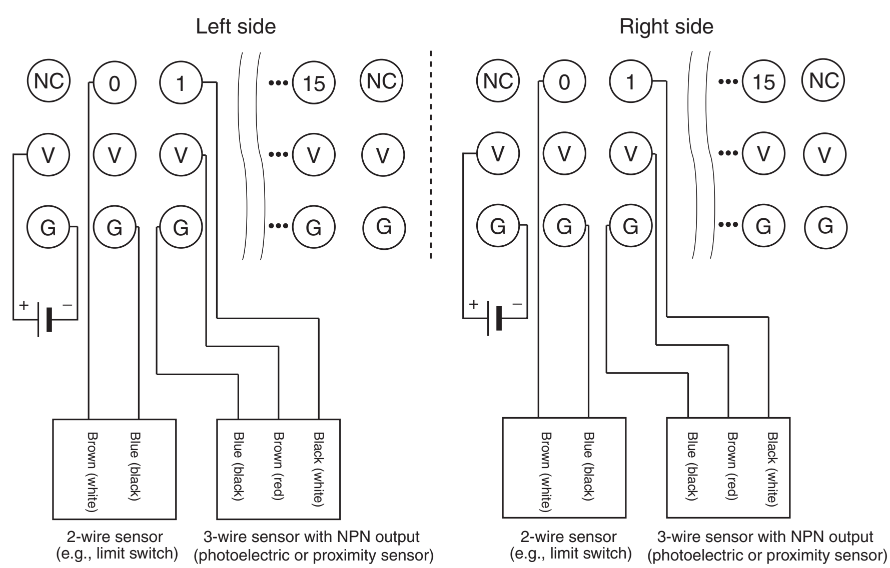


### DRT2-ID32SLH-1

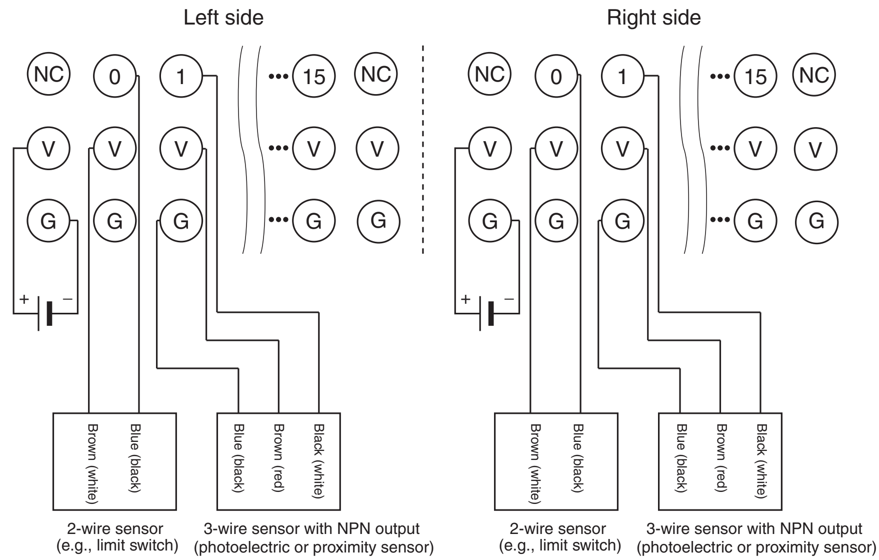



## Wiring

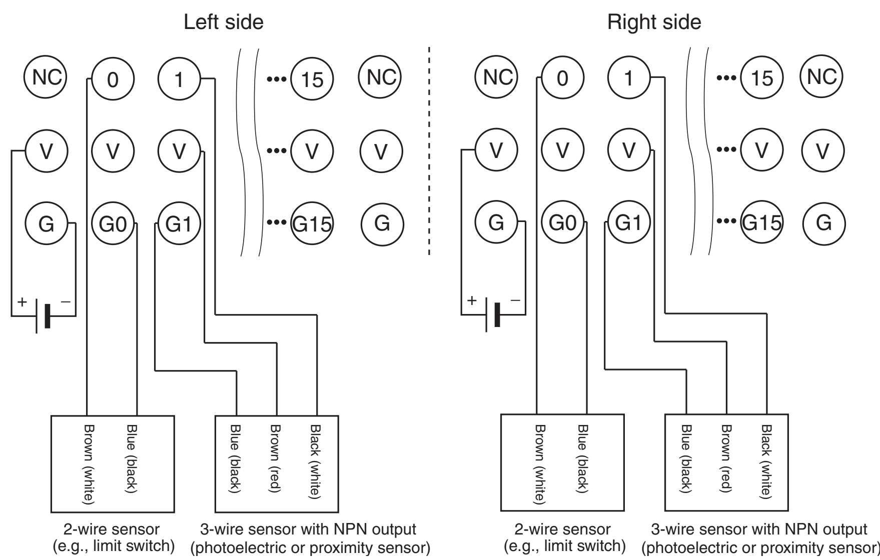
### DRT2-ID32SL (NPN)



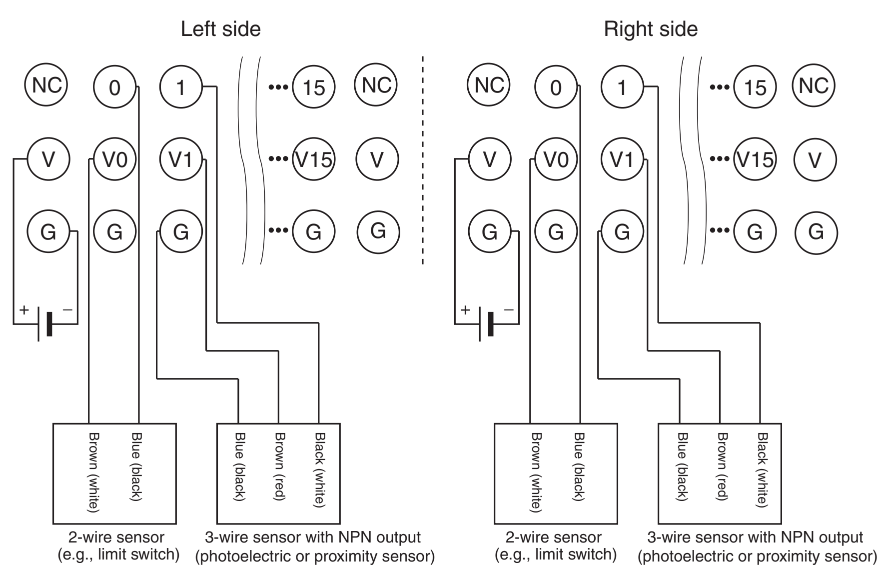
### DRT2-ID32SL-1 (PNP)




### DRT2-ID32SLH (NPN)



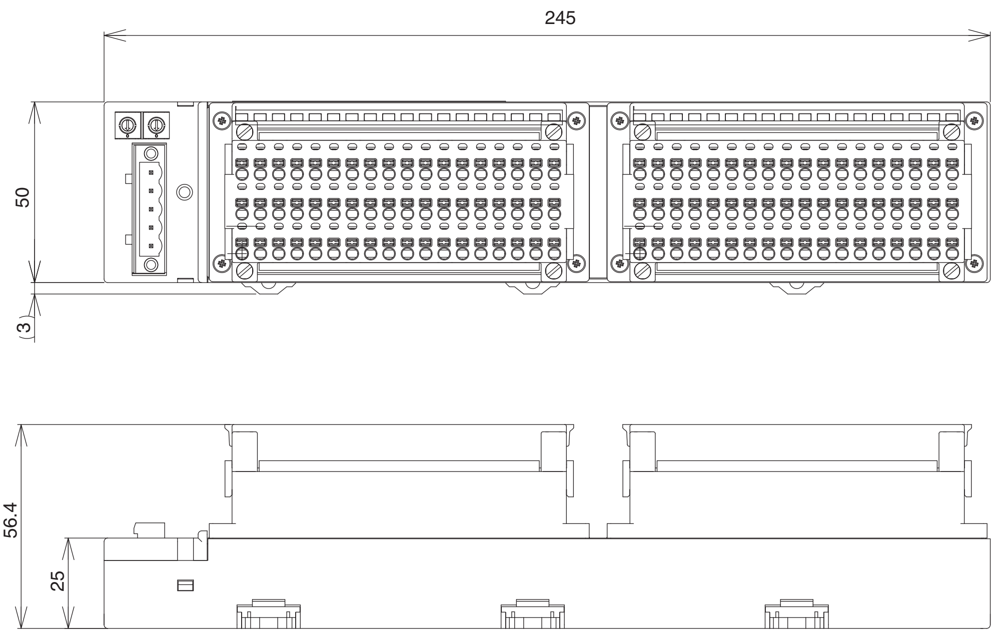

### DRT2-ID32SLH-1 (PNP)



**Note** 1. The I/O power supply's right-side and left-side V terminals, and the right-side and left-side G terminals, are not connected internally. Supply power separately between V and G on the right and left sides respectively.

2. Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

## Dimensions (Same for DRT2-ID32SL(-1) and DRT2-ID32SLH(-1))




# 5-7-6 Screw-less Clamp Terminals with and 16 Transistor Outputs

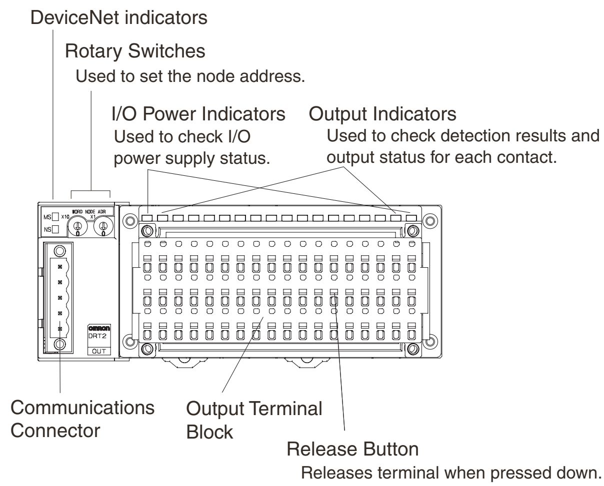
## Output Specifications

| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-OD16SL | DRT2-OD16SL-1 | DRT2-OD16SLH | DRT2-OD16SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Output points | 16 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Output current | 0.5 A/point, 4.0 A/common | | | |
| Residual voltage | 1.2 V max. | | | |
| Leakage current | 0.1 mA max. | | 0.1 mA max. (See note 1.) | |
| ON delay time | 0.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| Disconnection detection | --- | | Yes (See note 2.) | |
| Current supplied to output devices | 100 mA/output | | | |
| Output when error detected | According to hold/clear setting when error is detected. (The factory setting is for clear.) | | | |

**Note** 1. To enable detection of external load disconnections, a current of 0.1 mA or less is output to the load even when the output is OFF. Make sure that the load will not operate for this current.

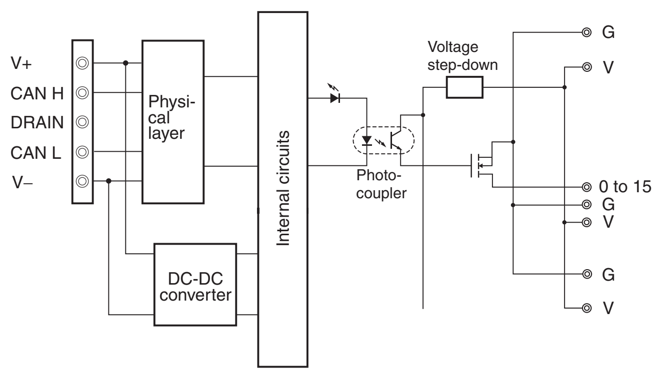
2. Disconnection detection can be used when the load current is 3 mA or higher. If the load current is less than 3 mA, disconnections may be falsely detected.

## Component Names and Functions (Same for DRT2-OD16SL(-1) and DRT2-OD16SLH(-1))

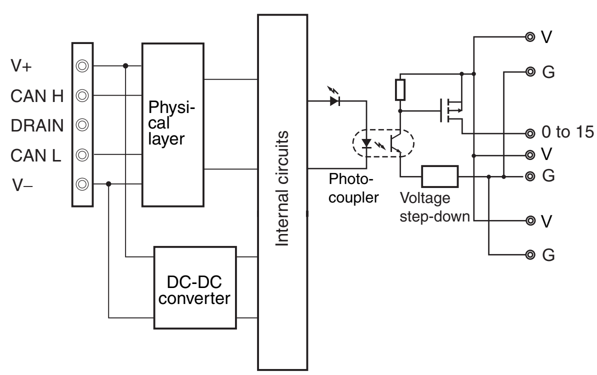



## Internal Circuits

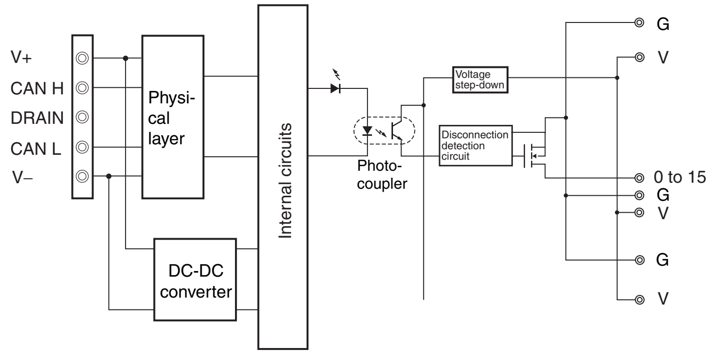
### DRT2-OD16SL (NPN)



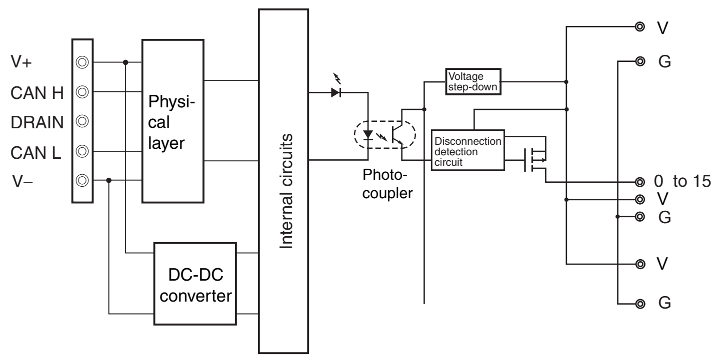

### DRT2-OD16SL-1 (PNP)



### DRT2-OD16SLH (NPN)

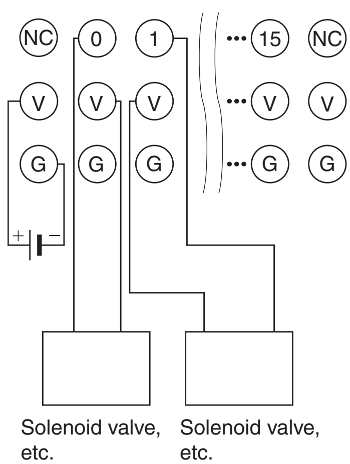



### DRT2-OD16SLH-1 (PNP)

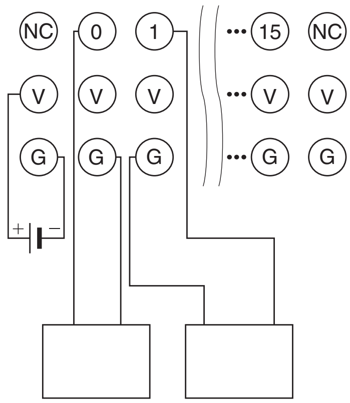



## Wiring

### DRT2-OD16SL (NPN)

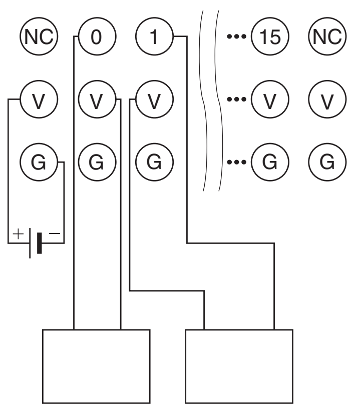


**DRT2-OD16SL-1 (PNP)**



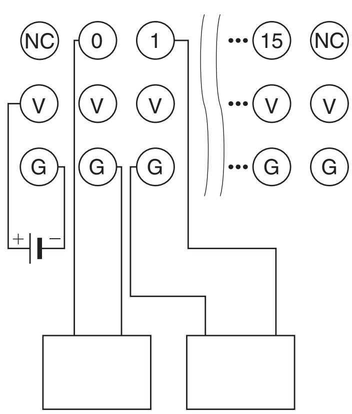

Solenoid valve, etc. Solenoid valve, etc.

**DRT2-OD16SLH (NPN)**




Solenoid valve, etc. Solenoid valve, etc.

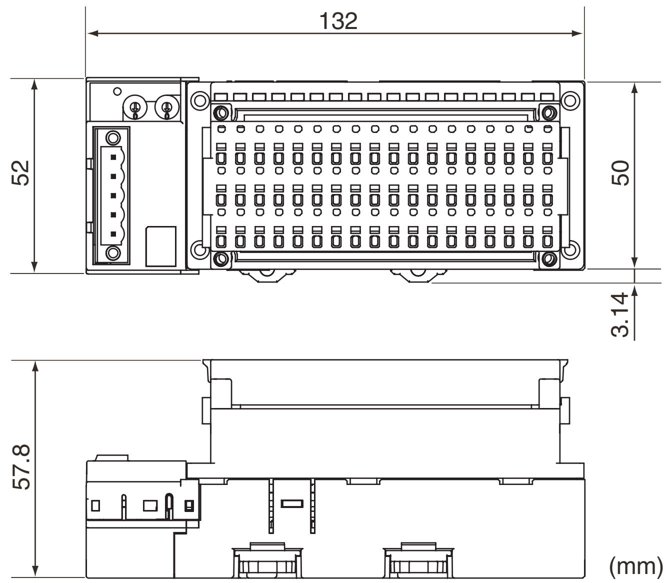
**DRT2-OD16SLH-1 (PNP)**




Solenoid valve, etc. Solenoid valve, etc.

**Note** When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions (Same for DRT2-OD16SL(-1) and DRT2-OD16SLH(-1))




## Load Short-circuit Protection: DRT2-OD16SLH and DRT2-OD16SLH-1

Normally, when the output contact (OUT) turns ON, the transistor turns ON, and output current (Iout) flows, as shown in Fig. 1.

If the current limit (Ilim) is exceeded when there is an overload in the output current (Iout) or when a load short-circuit occurs, as shown in Fig. 2 and 3, the output current (Iout) will be limited. Then, if the output transistor junction temperature (Tj) reaches the thermal shutdown temperature (Tstd), the output will be turned OFF to prevent damage to the transistor, the Load Shorted Flag will be turned ON, and the indicator will light red.

In automatic recovery mode (Fig. 2), the short-circuit protection status will be automatically cleared and the output current will start to flow again when the transistor's shutdown temperature (Tj) drops to the reset temperature (Tr).

In manual recovery mode (Fig. 3), the short-circuit protection status will be held even when the transistor's shutdown temperature (Tj) drops to the reset temperature (Tr), and recovery will occur when the Unit is reset by turning OFF the I/O power supply or the Unit's power supply.

**Fig. 1 Normal Operation**

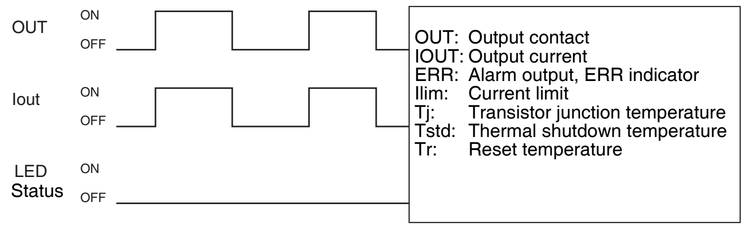



**Fig. 2 Overload or Short-circuit (Automatic Recovery Mode)**

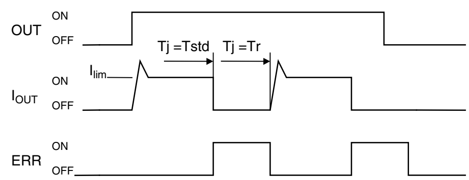
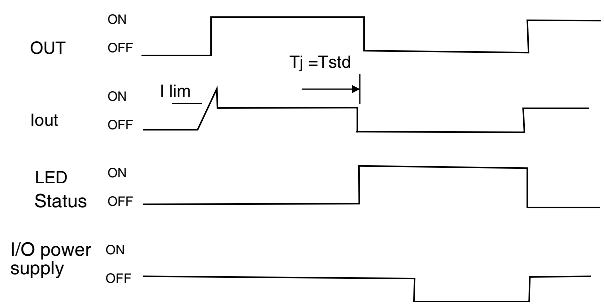



**Fig. 3 Overload or Short-circuit (Manual Recovery Mode)**



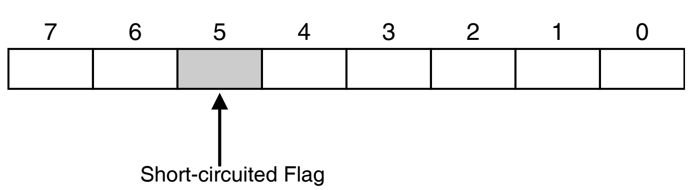

## Automatic Recovery Mode Restrictions

The Unit has load short-circuit protection, but automatic recovery mode is designed to protect the internal circuits specifically from a brief load short-circuit.

In automatic recovery mode, the Unit's load short-circuit protection is automatically cleared when Tj = Tr, as shown in Fig. 2. Therefore, as long as the cause of the short-circuit is not removed, the output's ON/OFF operation will repeat.

If the Unit is left with a short circuit, the internal temperature will rise, causing damage to the Unit. Always remove the cause of an external load short-circuit promptly.

**Note** When an external load short-circuit is detected, the External Load Shorted Flag will turn ON in the Unit's Status Area and the indicator corresponding to the shorted output contact will turn ON. An OR for all contact status will output to the Short-circuited Flag.
When the Load Shorted Flag turns ON, either hold the status of the bit in the user program and program to turn OFF all the Unit's outputs, or use an Explicit message to read the contact that is shorted and turn it OFF. The Short-circuited Flag is allocated in the fifth bit in the Unit's status information area.

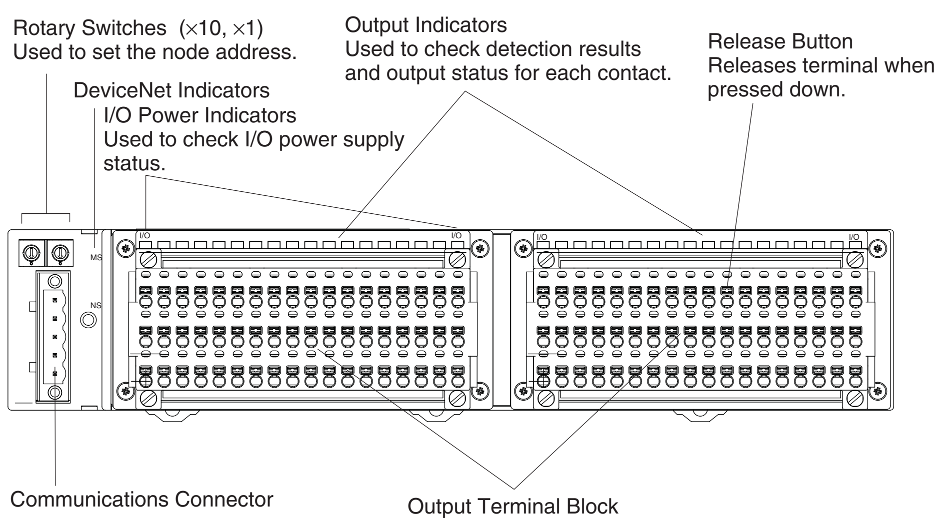


## 5-7-7 Screw-less Clamp Terminals with and 32 Transistor Outputs

### Output Specifications

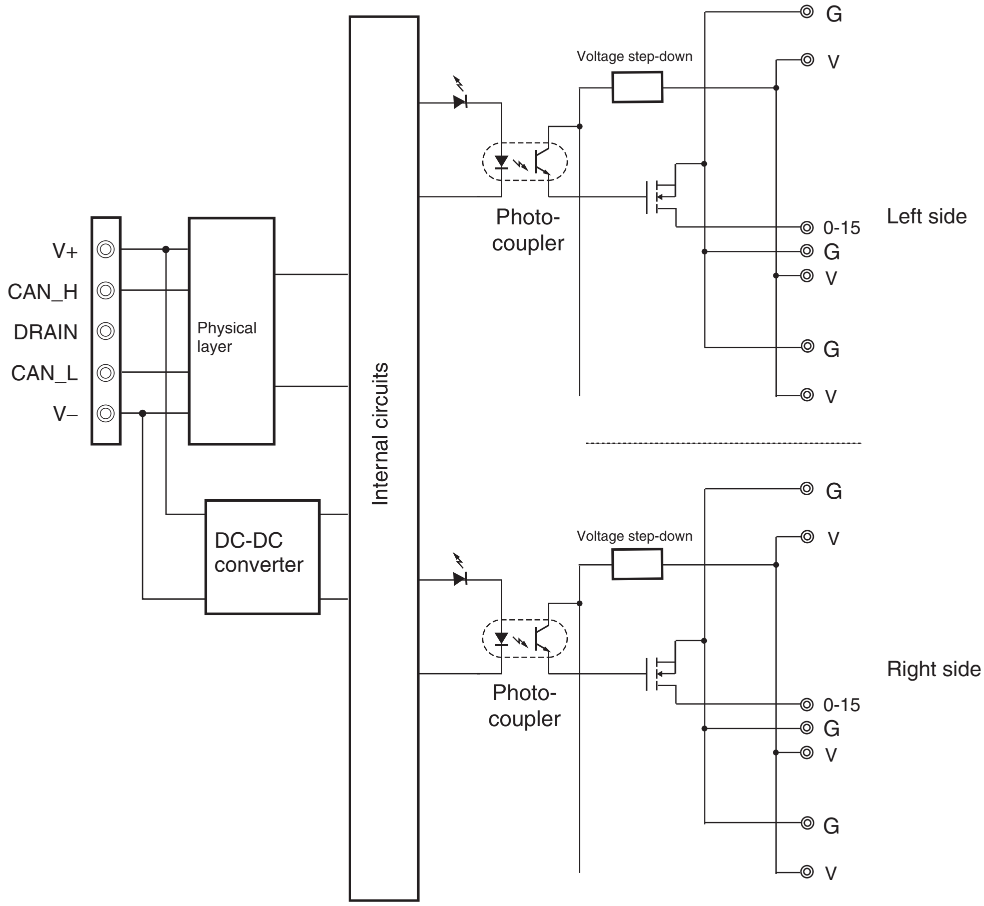
| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-OD32SL | DRT2-OD32SL-1 | DRT2-OD32SLH | DRT2-OD32SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Output points | 32 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Output current | 0.5 A/point, 4.0 A/common | | | |
| Residual voltage | 1.2 V max. | | | |
| Leakage current | 0.1 mA max. | | | |
| ON delay time | 0.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| Disconnection detection | --- | | Operates at current consumption of 3 mA/ point max. (Not detected at 3 mA or less.) | |
| Output when error detected | According to hold/clear setting when error is detected. (The factory setting is for clear.) | | | |
| Current supplied to output devices | 100 mA/output | | | |
| External load short-circuit detection current | --- | | | 4.0 A min./common |

### Component Names and Functions (Same for DRT2-OD32SL(-1) and DRT2-OD32SLH(-1))

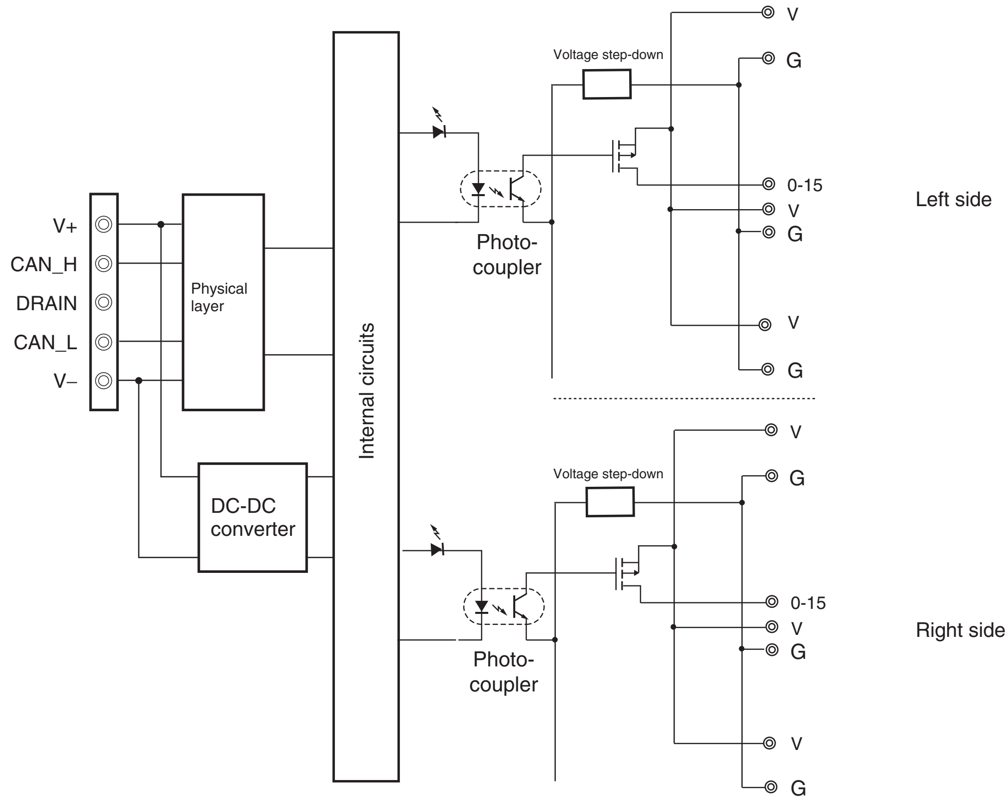


## Internal Circuits

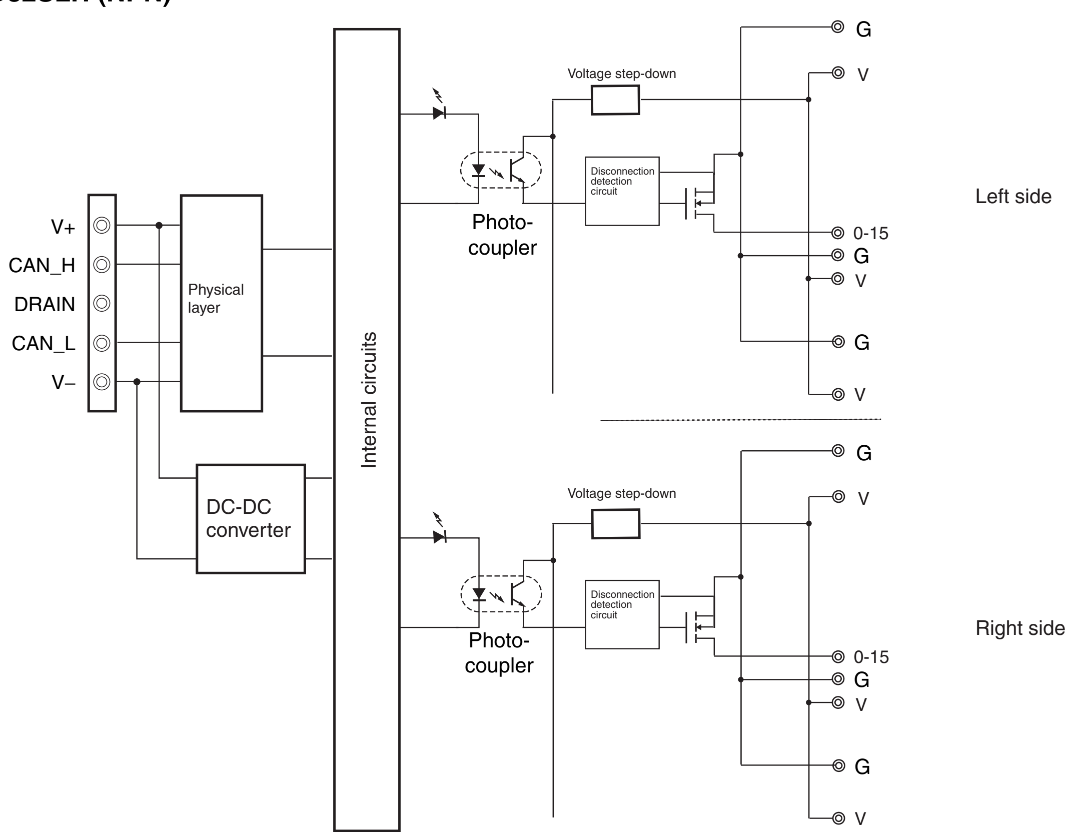
### DRT2-OD32SL (NPN)



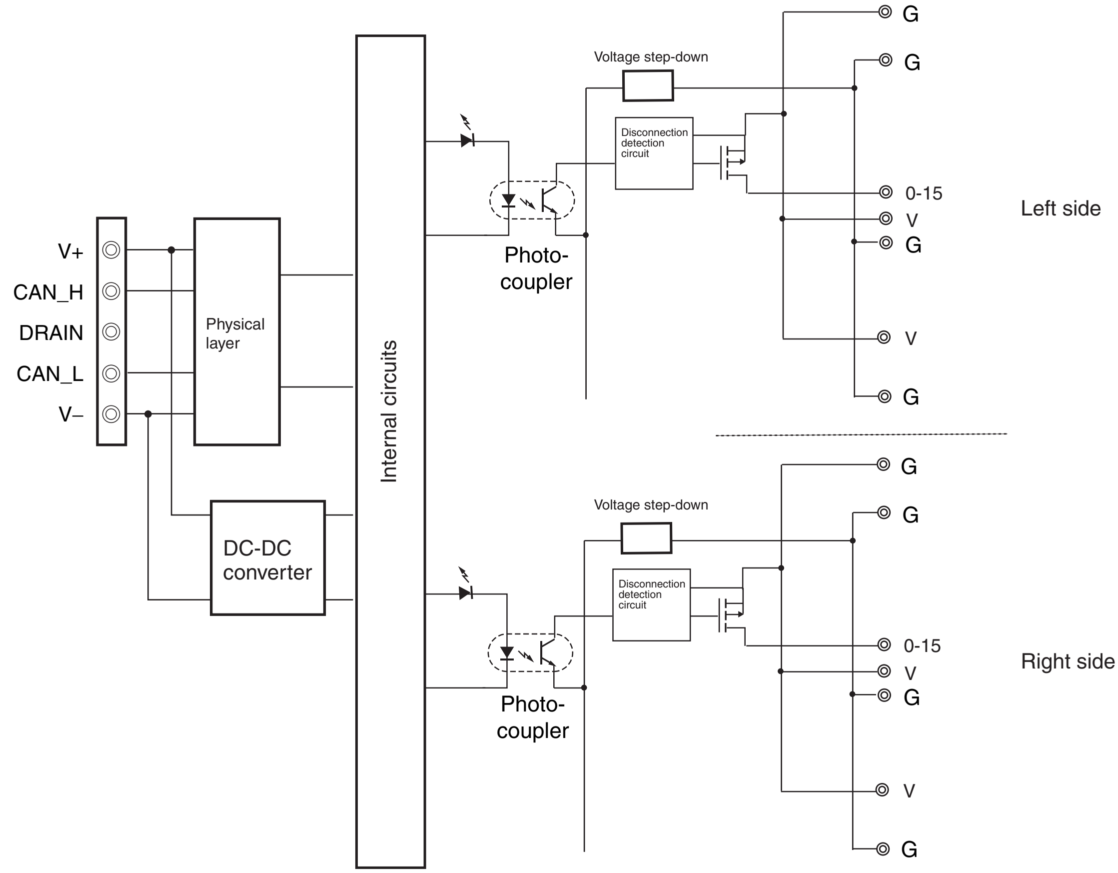
### DRT2-OD32SL-1 (PNP)




### DRT2-OD32SLH (NPN)

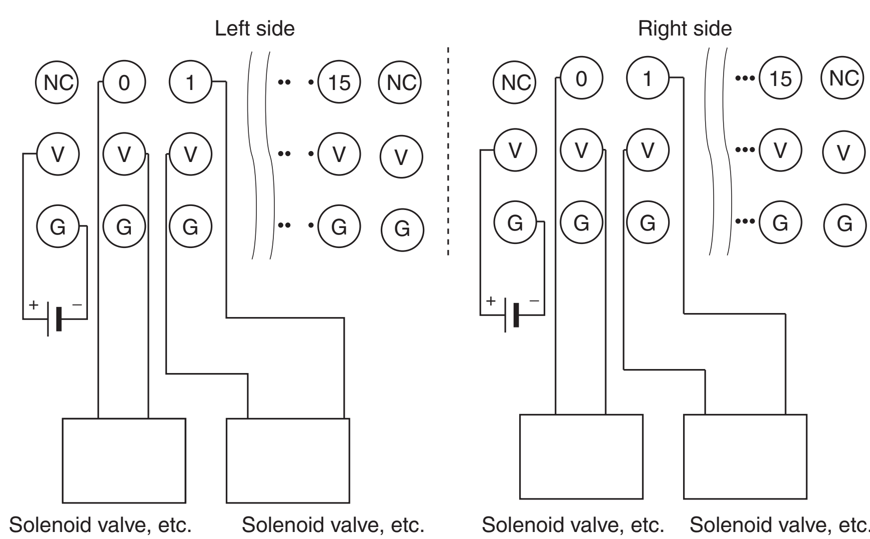


### DRT2-OD32SLH-1 (PNP)

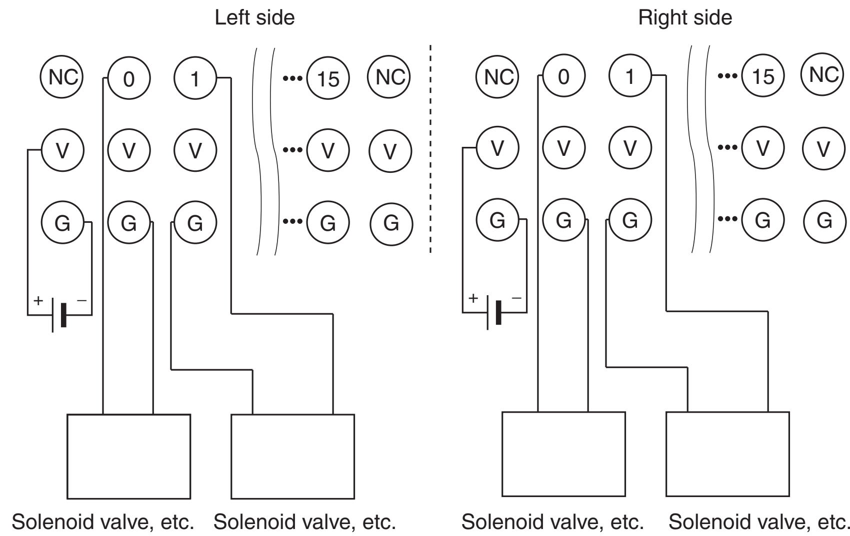



## Wiring

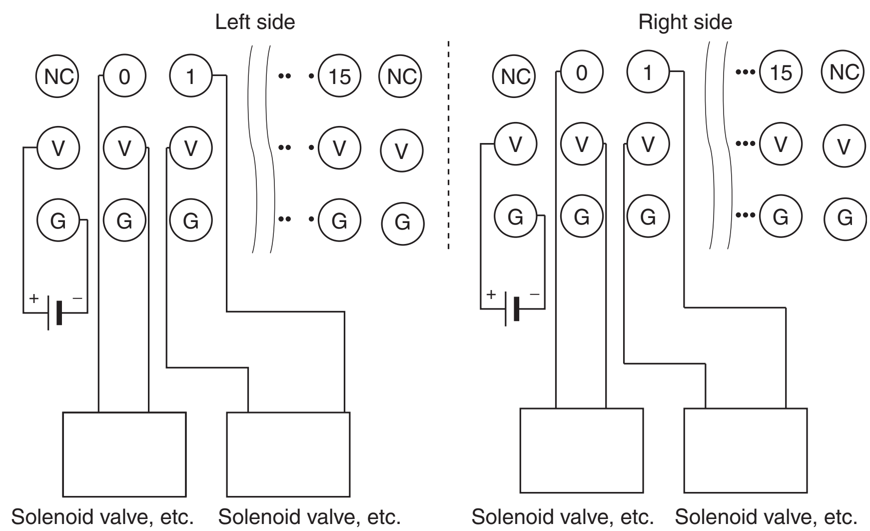
### DRT2-OD32SL (NPN)



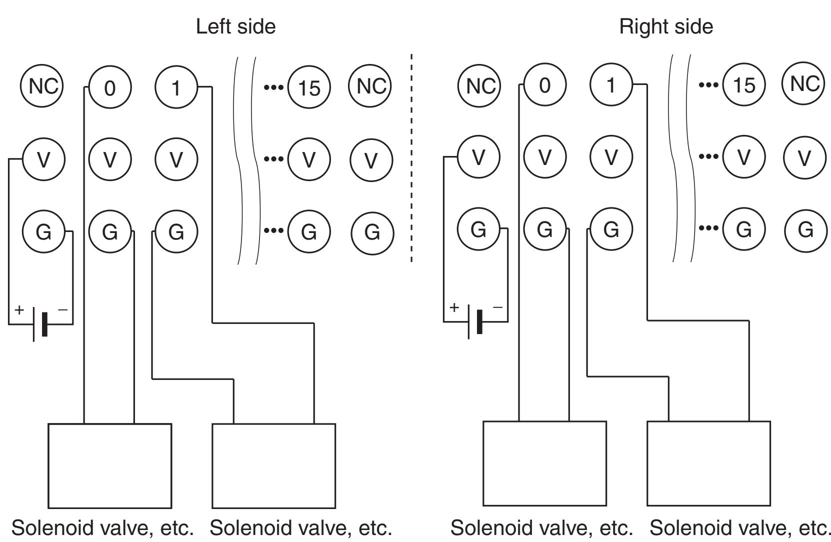
**DRT2-OD32SL-1 (PNP)**




**DRT2-OD32SLH (NPN)**



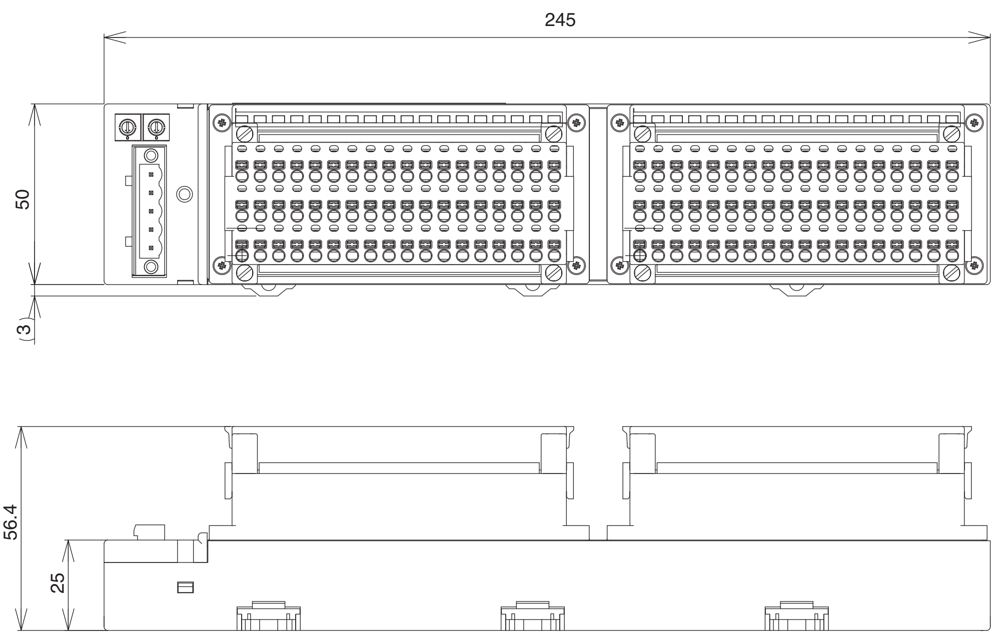

**DRT2-OD32SLH-1 (PNP)**



**Note** 1. The I/O power supply's right-side and left-side V terminals, and the right-side and left-side G terminals, are not connected internally. Supply power separately between V and G on the right and left sides respectively.

2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions (DRT2-OD32SL-1 and DRT2-OD32SLH-1)




# 5-7-8 Screw-less Clamp Terminals with 16 Transistor Inputs and Outputs

## Input Specifications

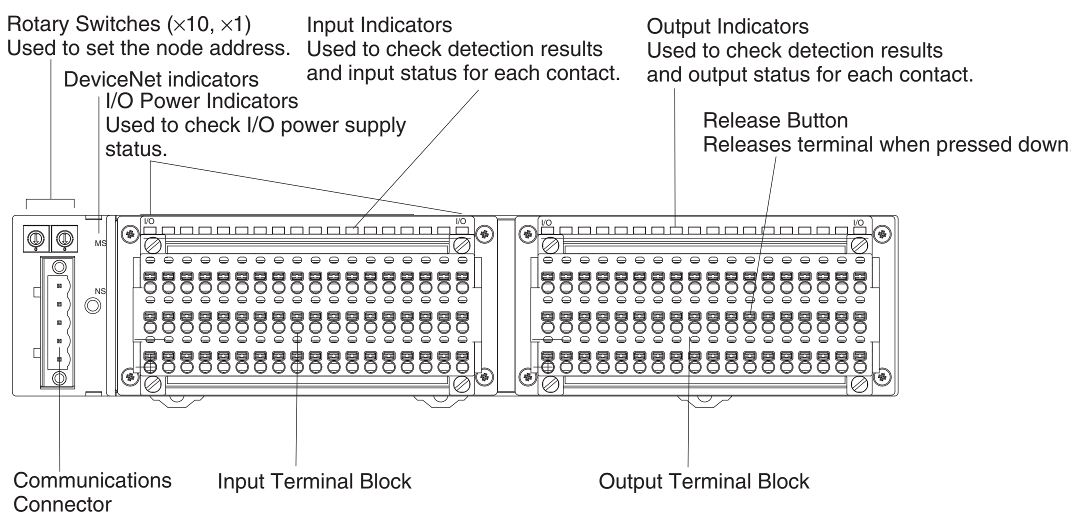
| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-MD32SL | DRT2-MD32SL-1 | DRT2-MD32SLH | DRT2-MD32SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Input points | 16 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Input current | 6.0 mA max./point at 24 V DC, 3.0 mA min./point at 17 V DC | | | |
| Input resistance | 4 kΩ | | | |
| ON delay time | 1.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| ON current | 3 mA min. | | | |
| OFF current | 1 mA max. | | | |
| Number of circuits | 16 points with one common | | | |
| Power supply short-circuit protection | --- | | Operates at 50 mA/point min. | |

| Item | Specification | |
|---|---|---|
| Disconnection detection | --- | Operates at 0.3 mA max. |
| Current supplied to input devices | 100 mA/input | 50 mA/input |

## Output Specifications

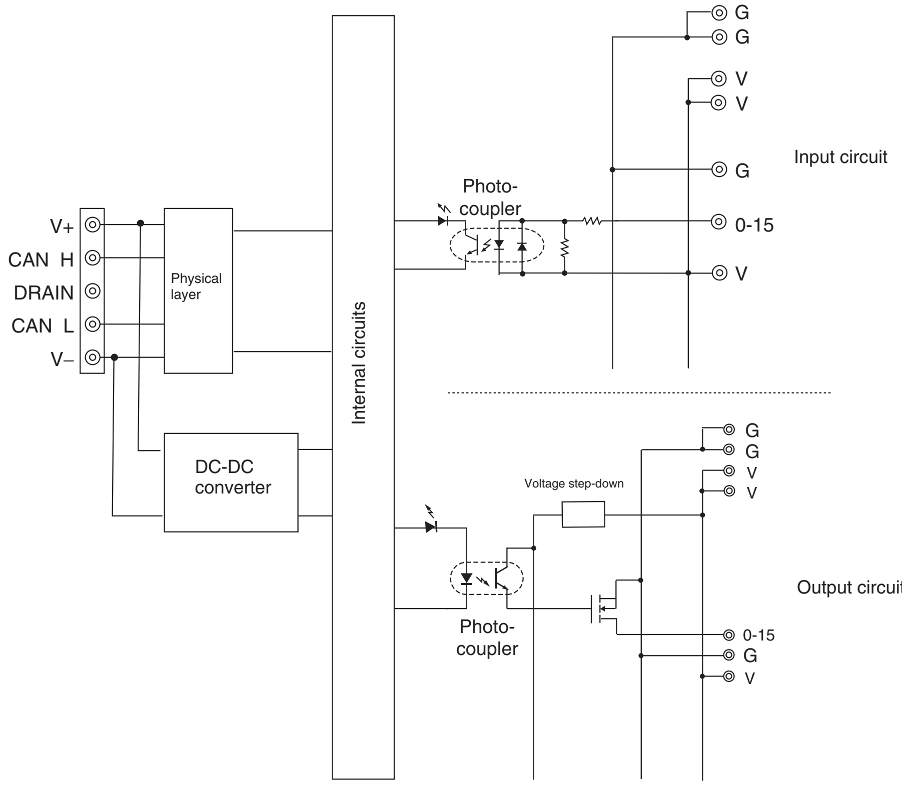
| Item | Specification | | | |
|---|---|---|---|---|
| Model | DRT2-MD32SL | DRT2-MD32SL-1 | DRT2-MD32SLH | DRT2-MD32SLH-1 |
| Internal I/O common | NPN | PNP | NPN | PNP |
| Output points | 16 points | | | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15% to 10%) | | | |
| Output current | 0.5 A/point, 4.0 A/common | | | |
| Residual voltage | 1.2 V max. | | | |
| Leakage current | 0.1 mA max. | | | |
| ON delay time | 0.5 ms max. | | | |
| OFF delay time | 1.5 ms max. | | | |
| Disconnection detection | --- | | Operates at current consumption of 3 mA/point max. (Not detected at 3 mA or less.) | |
| Current supplied to output devices | 100 mA/output | | | |
| Output when error detected | According to hold/clear setting when error is detected. (The factory setting is for clear.) | | | |
| External load short-circuit detection current | --- | | | 4.0 A min./common |

## Component Names and Functions (Same for DRT2-MD32SL(-1) and DRT2-MD32SLH(-1))

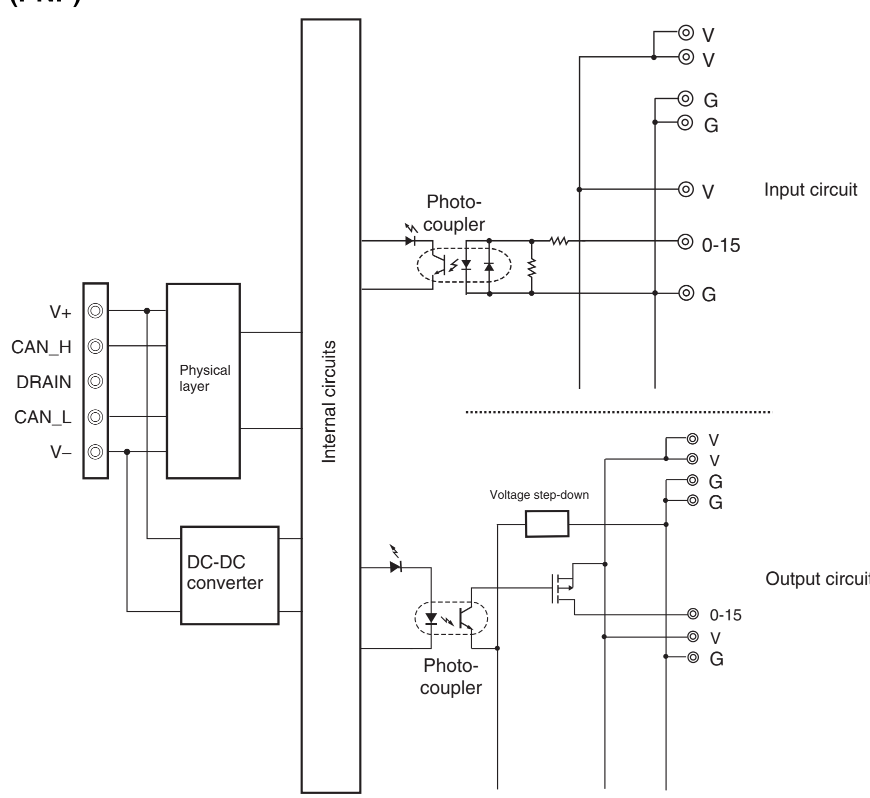


## Internal Circuits

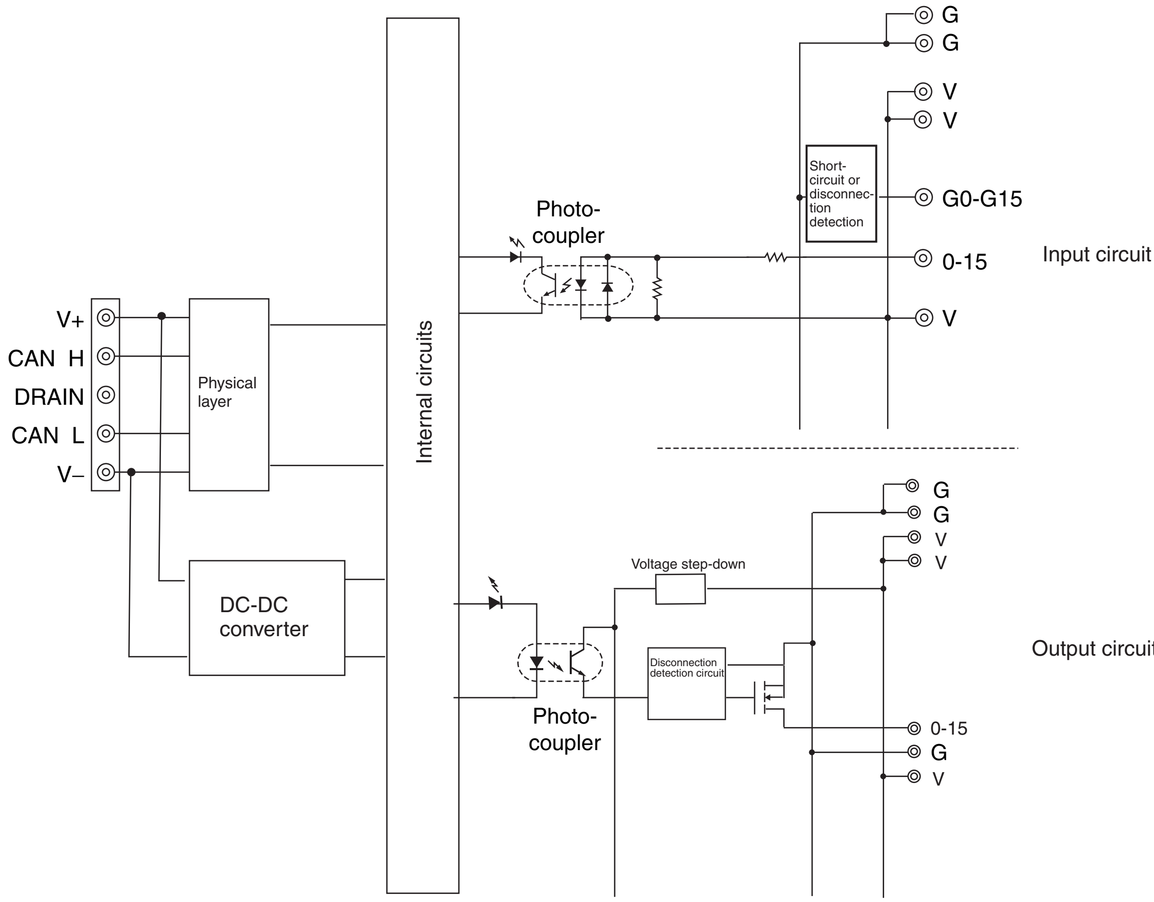
### DRT2-MD32SL (NPN)



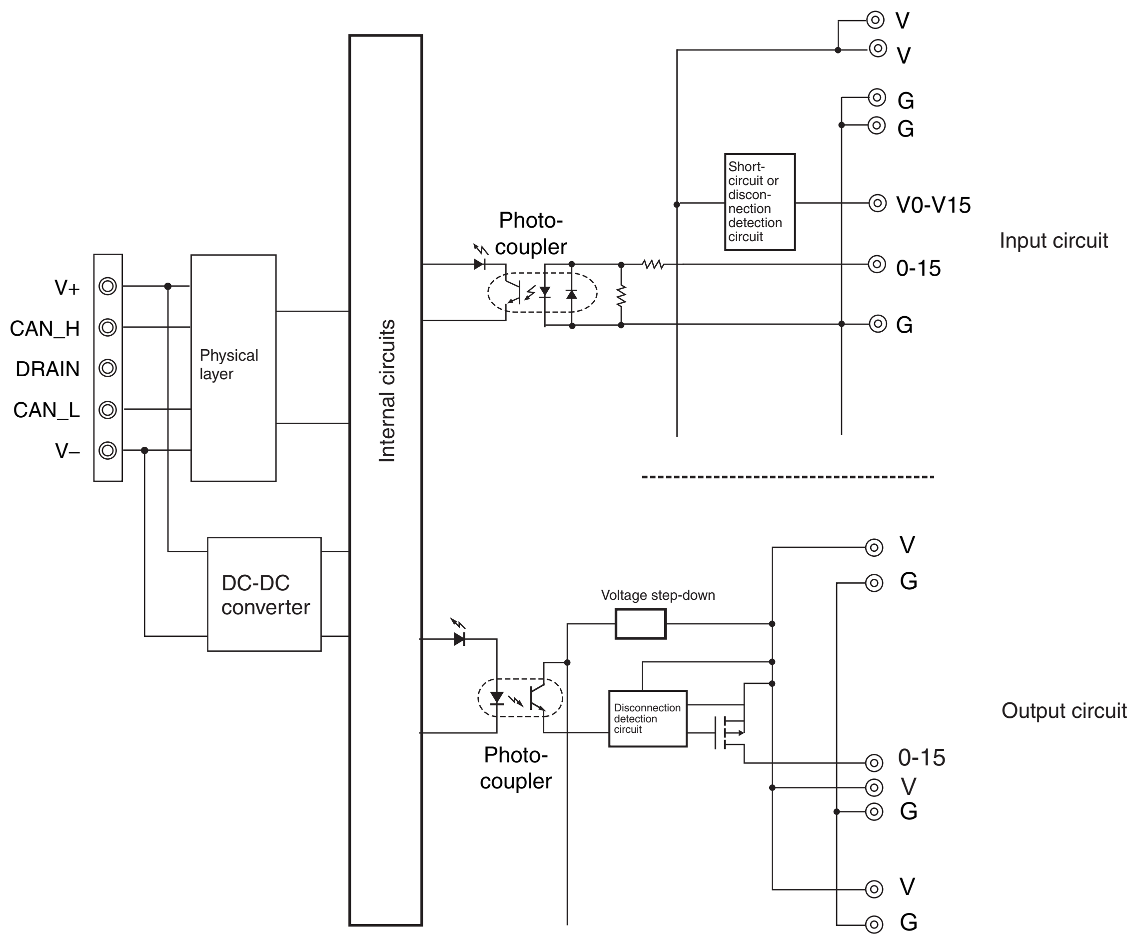

### DRT2-MD32SL-1 (PNP)



### DRT2-MD32SLH (NPN)

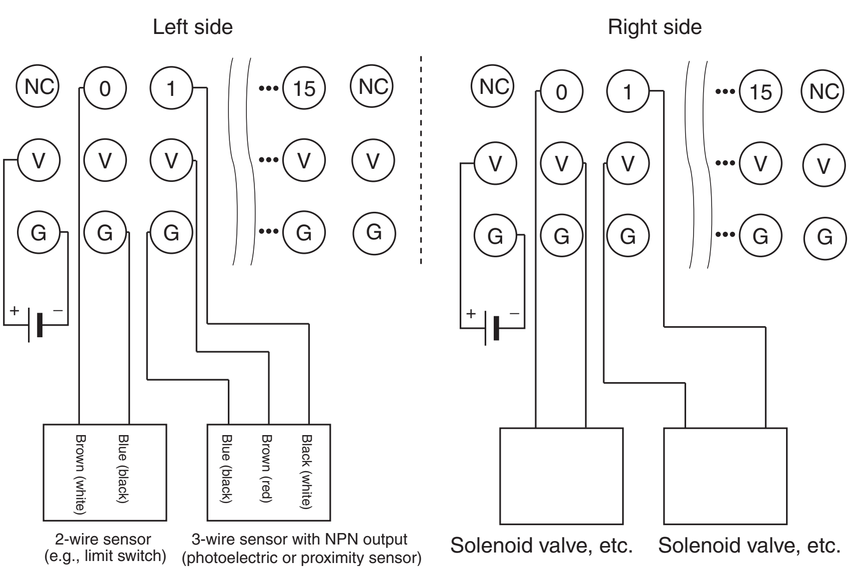


### DRT2-MD32SLH-1 (PNP)

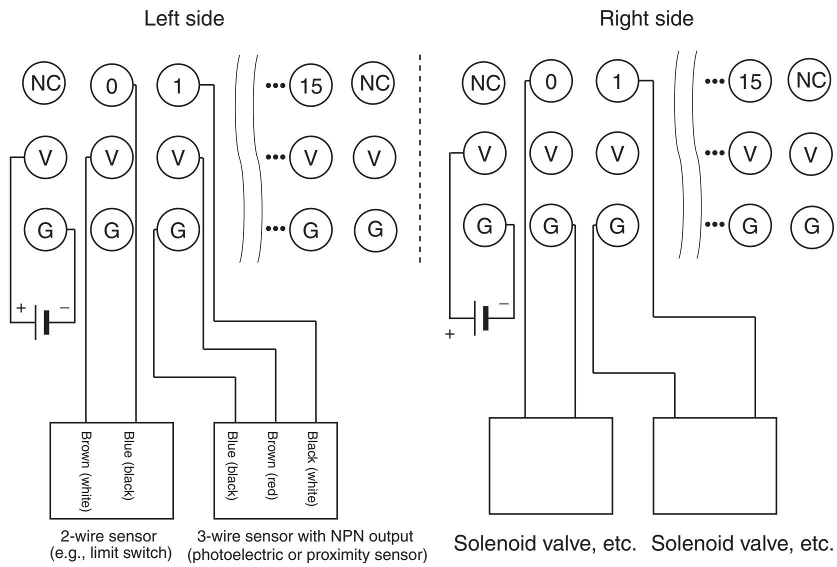



## Wiring

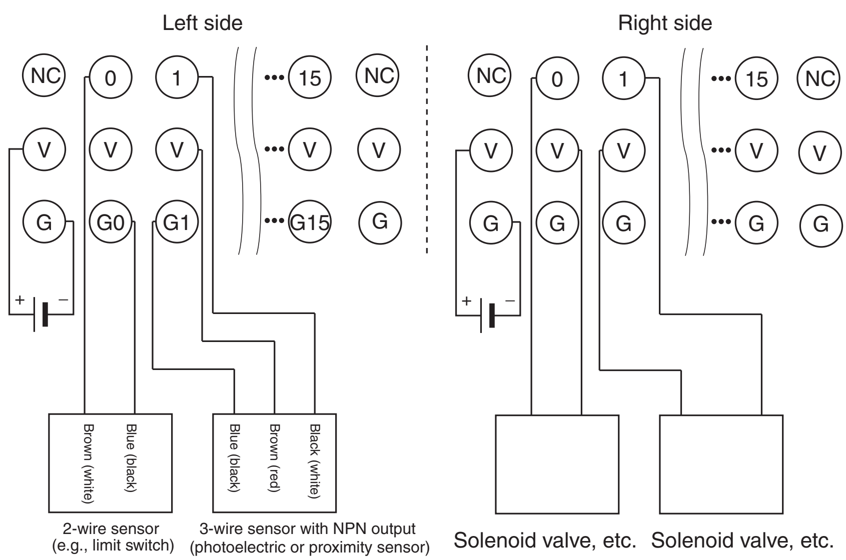
### DRT2-MD32SL (NPN)



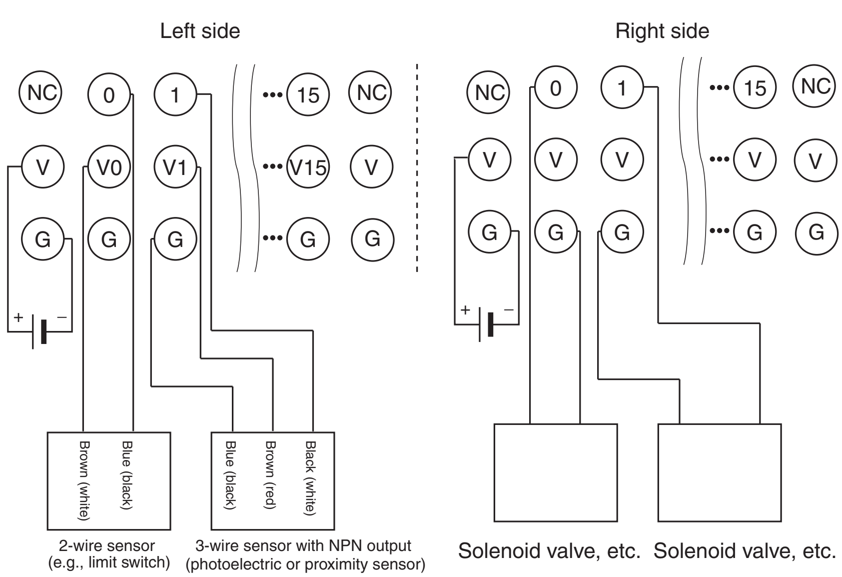
### DRT2-MD32SL-1 (PNP)




### DRT2-MD32SLH (NPN)

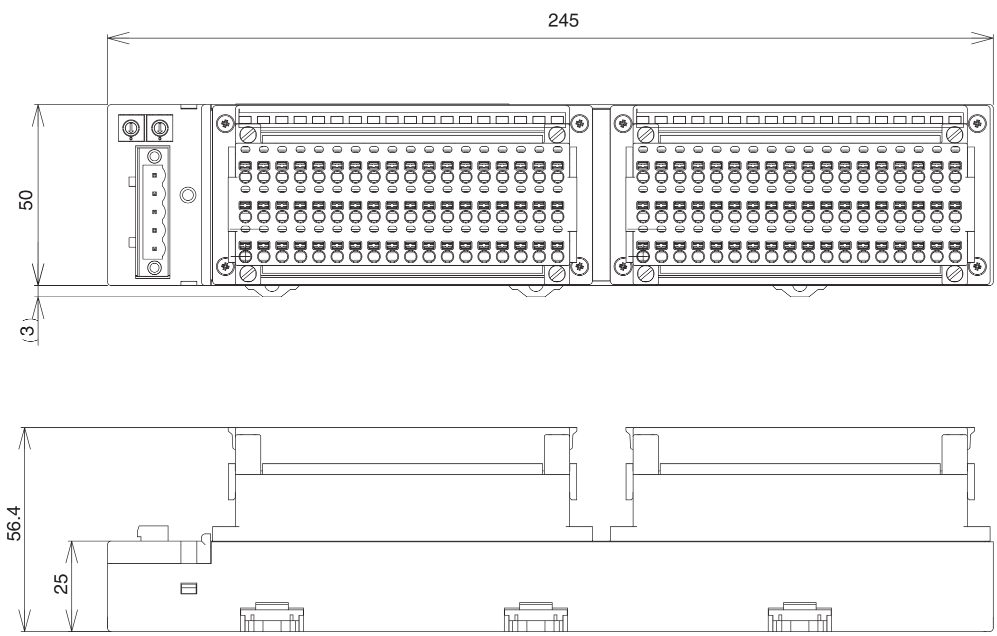



### DRT2-MD32SLH-1 (PNP)



**Note**
1. The I/O power supply's right-side and left-side V terminals, and the right-side and left-side G terminals, are not connected internally. Supply power separately between V and G on the right and left sides respectively.
2. When using inductive loads (such as solenoid valves), use a load with a built-in diode to absorb reverse power or attach a diode externally. (Refer to *Appendix G Wiring External Output Signal Lines*.)
3. Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

## Dimensions




## 5-7-9 Mounting to a Control Panel

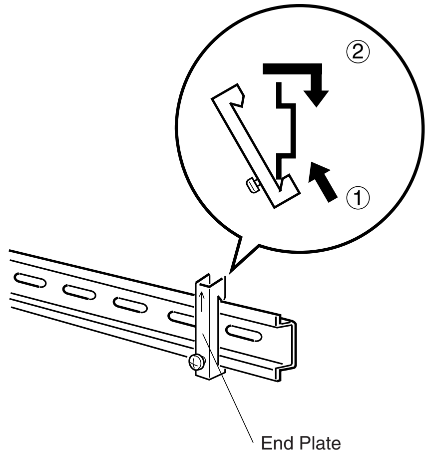
A Remote I/O Terminal (either a Basic Unit or Expansion Unit) can be mounted to a control panel as shown below.

### Mounting to a DIN Track

Mount a 35-mm DIN Track to the rear panel of the Slave. Firmly insert the Slave into the DIN Track while pulling down the DIN Track mounting hooks on the rear panel with a screwdriver. Secure the Slave on the right and left sides between a pair of end plates.

**Mounting the End Plates**

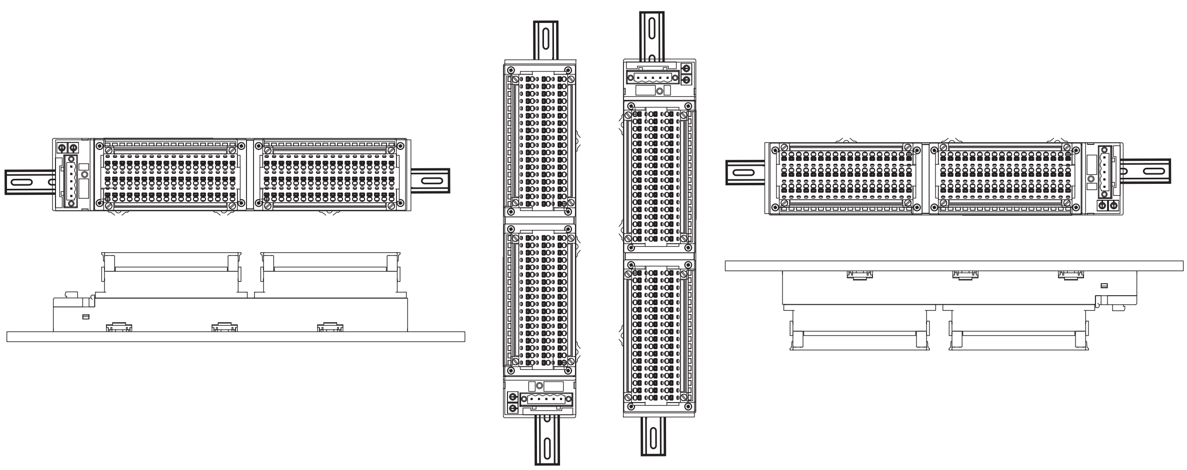
First latch the bottom of the end plate (step 1 in the diagram below), and then latch the top and pull down (step 2 below).




**Note** The Slave must be secured on both sides by a pair of end plates.

## Mounting Direction

Unless specified in the Slave's documentation, there are no restrictions on the mounting direction. The Slave can be mounted in any of the six directions shown below.



# SECTION 6
# Environment-resistive Slaves

This section provides the specifications and describes the components, terminal arrangements, basic procedures for wiring, and methods for connecting cables of Environment-resistive Slaves (conforming to IP67). Information on Slave settings, mounting and wiring methods are also provided separately for each Slave type.

# 6-1 Common Specifications for Environment-resistive Slaves

The following table lists specifications that are common to all Environment-resistive Slaves. For details on specifications for each Slave, refer to the following Slave specifications pages.

| Item | Specifications |
|---|---|
| Communications power supply voltage | 11 to 25 V DC (Supplied from the communications connector.) |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) |
| Noise immunity | Conforms to IEC61000-4-4. 2 kV (power lines) |
| Vibration resistance | 10 to 150 Hz, 0.7-mm double amplitude |
| Shock resistance | 150 $m/s^2$ |
| Dielectric strength | 500 V AC (between isolated circuits) |
| Insulation resistance | 20 MΩ min. (between isolated circuits) |
| Ambient temperature | –10 to +55°C |
| Ambient humidity | 25% to 85% (with no condensation) |
| Operating environment | No corrosive gases |
| Storage temperature | –25 to +65°C |
| Enclosure rating | IP67 |
| Mounting | M5 screws for both front and rear panel |
| Mounting strength | 100 N |
| Communications connector strength | 30 N |
| Connector type | DeviceNet communication connector: M12<br>Connector for external power supply: 7/8-16UN<br>I/O connector: M12 |
| Screw tightening torque | Round connector (communications connectors, power supply, I/O): 0.39 to 0.49 N·m<br>M5 (mounting Unit from front panel): 1.47 to 1.96 N·m<br>Cover for node address setting switch: 0.4 to 0.6 N·m |

## 6-1-1 Current Consumption, Weight, Enclosure Ratings

The following table lists the current consumption, weight, and enclosure ratings for Environment-resistive Slaves.

| Model | Communications current consumption | Weight | Enclosure rating |
|---|---|---|---|
| DRT2-ID08C(-1) | 115mA max. (24 V DC)<br>90mA max. (11 V DC) | 340 g max. | IP67 |
| DRT2-HD16C(-1) | 200mA max. (24 V DC)<br>130mA max. (11 V DC) | 340 g max. | |
| DRT2-OD08C(-1) | 35mA max. (24 V DC)<br>60mA max. (11 V DC) | 390 g max. | |
| DRT2-ID04CL(-1) | 35mA max. (24 V DC)<br>55mA max. (11 V DC) | 275 g max. | |
| DRT2-OD04CL(-1) | 35mA max. (24 V DC)<br>55mA max. (11 V DC) | 275 g max. | |
| DRT2-ID08CL(-1) | 35mA max. (24 V DC)<br>50mA max. (11 V DC) | 390 g max. | |
| DRT2-HD16CL(-1) | 40mA max. (24 V DC)<br>55mA max. (11 V DC) | 390 g max. | |
| DRT2-OD08CL(-1) | 35mA max. (24 V DC)<br>50mA max. (11 V DC) | 390 g max. | |
| DRT2-WD16CL(-1) | 35mA max. (24 V DC)<br>55mA max. (11 V DC) | 390 g max. | |
| DRT2-MD16CL(-1) | 40mA max. (24 V DC)<br>55mA max. (11 V DC) | 390 g max. | |

## 6-1-2 I/O Indicators

### Advanced Slaves (DRT2-□D□□C(-1))

The following table describes the meanings of the I/O indicators provided on Advanced Environment-resistive Slaves. Two I/O indicators, □-A and □-B, are provided for each connector.

| Indicator | Color | Status | Definition | Meaning |
|---|---|---|---|---|
| □-A | Yellow | ON | Device operational | Input ON/Output ON |
| | Red | ON | Unrecoverable fault | Sensor power shorted |
| | | Flashing | Minor fault | Sensor disconnected |
| | --- | OFF | Device operational | Input OFF/output OFF/input power OFF |
| □-B | Yellow | ON | Device operational | Input ON |
| | Red | ON | Unrecoverable fault | Output load shorted |
| | --- | OFF | Device operational | Input OFF/input power OFF |

The box indicates the number of the corresponding connector.

**Standard Slaves (DRT2-□D□□CL(-1)**

The following table describes the meanings of the I/O indicators provided on Standard Environment-resistive Slaves. Two I/O indicators, □-A and □-B, are provided for each connector.

| Indicator | Color | Status | Definition | Meaning |
|---|---|---|---|---|
| □-A | Yellow | ON | Device operational | Input ON/Output ON |
| | --- | OFF | Device operational | Input OFF/output OFF/input power OFF |
| □-B | Yellow | ON | Device operational | Input ON |
| | --- | OFF | Device operational | Input OFF/input power OFF |

The box indicates the number of the corresponding connector.

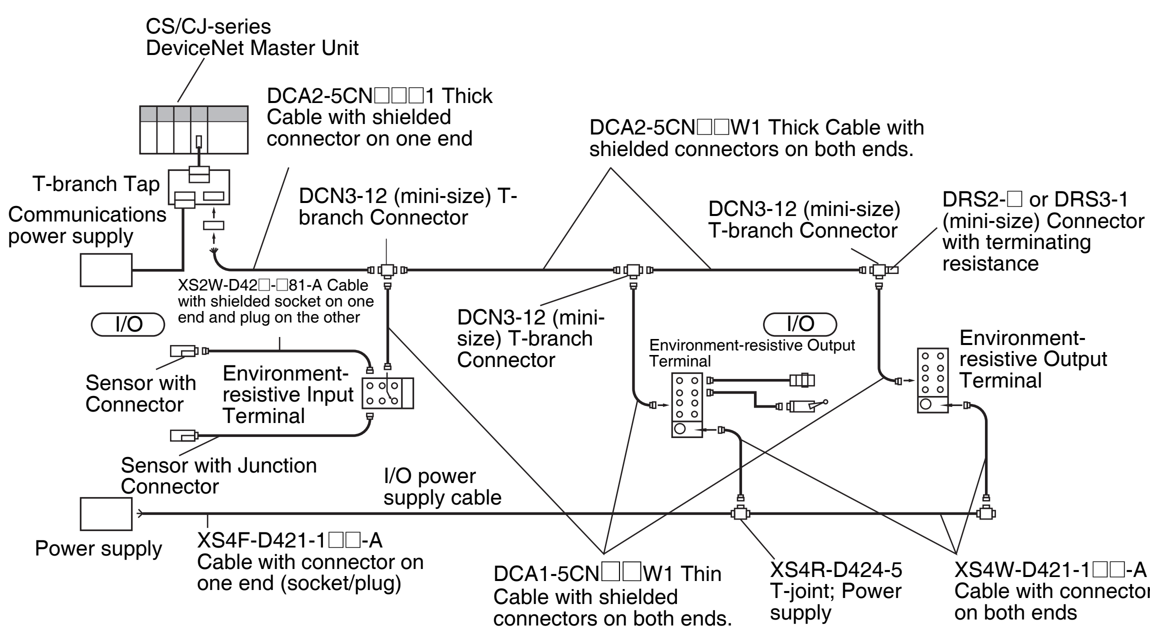
# 6-2 Connecting Communications Cables to Environment-resistive Slaves

Communications cables are connected to Environment-resistive Slaves using round connectors.

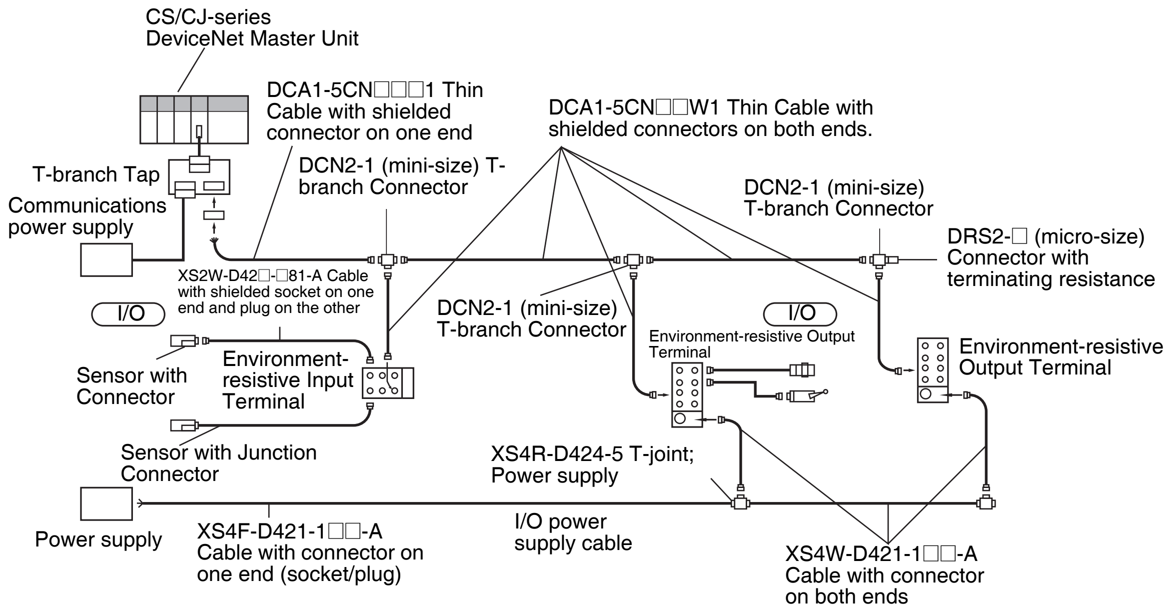
Either Thin Cables or Thick Cables can be used as communications cables with the round connectors. Slaves that use the standard square connectors can also be connected to the Master Unit through a T-branch Tap.

The following wiring examples are for systems using Environment-resistive Slaves.

## 6-2-1 System consisting of a thick cable for the trunk line and thin cables for the branch lines



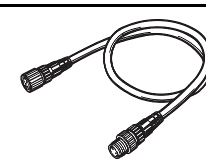
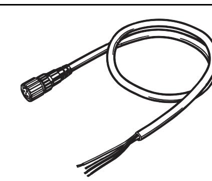
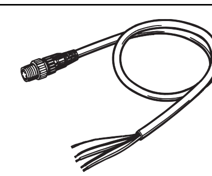
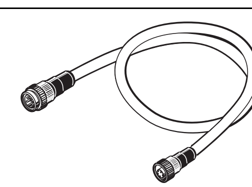
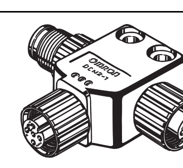
## 6-2-2 System consisting of thin cables for both the trunk line and branch lines



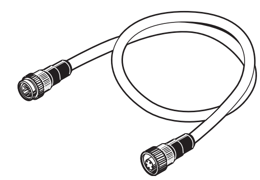
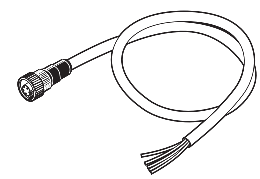
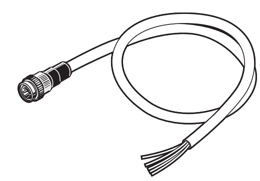
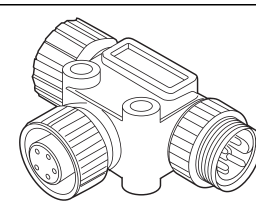
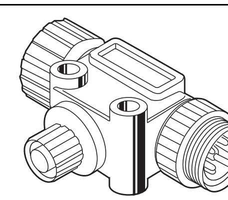

## 6-2-3 Communication cables used for wiring of environment-resistant terminals

Always use the cables with connectors indicated below for wiring of environment-resistant terminals.

### Thin Cables with Connectors: Micro-size (previous M12)

| Model | Description |
|---|---|
| DCA1-5CN□□W1 | Cable with shielded connectors on both ends  |
| DCA1-5CN□□F1 | Cable with shielded connector (female socket) on one end  |
| DCA1-5CN□□H1 | Cable with shielded connector (male plug) on one end  |
| DCA1-5CN□□W5 | Cable with shielded connector on both ends (male plug on mini-size end, female socket on micro-size end)  |
| DCN2-1 | Shielded T-branch Connector (for one branch line)  |

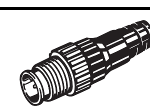
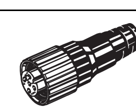
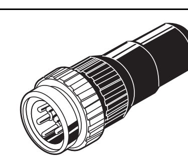
## Thick Cables with Connectors: Mini-size

| Model | Description |
|---|---|
| DCA2-5CN□□W1 | Cable with shielded connectors on both ends  |
| DCA2-5CN□□F1 | Cable with shielded connector (female socket) on one end  |
| DCA2-5CN□□H1 | Cable with shielded connector (male plug) on one end  |
| DCN3-11 | Shielded T-branch Connector (for one branch line)  |
| DCN3-12 | Shielded T-branch Connector (for one branch line)<br>An M12 connector is used for the branch line.  |

**Note**

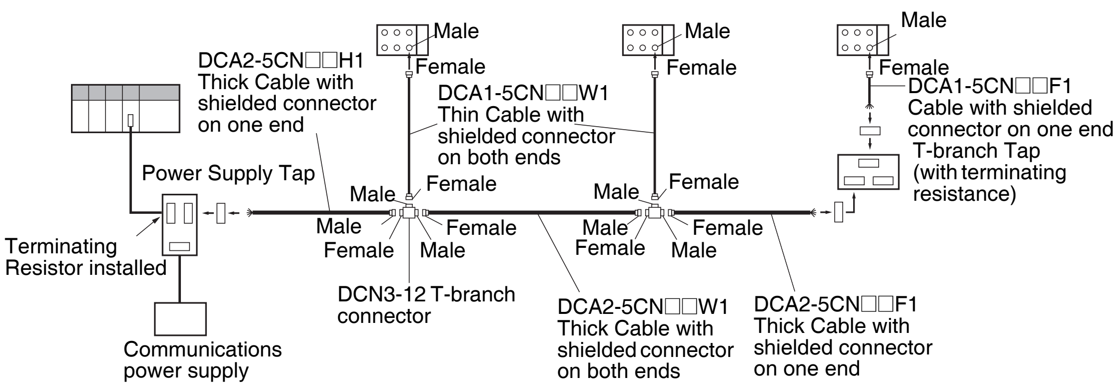
1. The boxes in the model numbers indicate the cable length in 1-m units. A cable of 0.5 m, however, is indicated as “C5.” A thick cable cannot be directly connected to an environment-resistant terminal.
2. Standard DeviceNet cables are used for these connections, so the cables cannot be used in environments subject to spattering, unless measures are taken to protect the cables.

The following connectors with built-in terminating resistance are also available. A Terminating Resistor can also be connected to a T-branch Connector.

| Model | Details |
|---|---|
| DRS2-1 | Shielded Connector (male plug, micro-size) with terminating resistance.  |
| DRS2-2 | Shielded Connector (female socket, micro-size) with terminating resistance.  |
| DRS3-1 | Shielded Connector (male plug, mini-size) with terminating resistance.  |

**Note** The allowable current of Thin Cables with shielded connectors is 3 A, and for Thick Cables the allowable current is 8 A.
Multi-drop wiring cannot be used for round communications connectors. Use T-branch wiring and T-branch Taps to connect cables with shielded connectors on both ends.
The rated current capacity of the T-branch Connector's communications power supply pin is 3 A.
A cable with a connector (socket) on one end can be used to connect to a standard DCN1-□C T-branch Tap. A cable with a connector (socket) on one end can also be used to connect to the communications power supply from a T-branch Connector.

### 6-2-4 Example System Assembly




**Note** Tighten the connector by hand to a torque of 0.39 to 0.49 N·m. If the connector is not tightened sufficiently, it will not provide the expected degree of protection and may become loose due to vibration.
Do not use pliers or other tools to tighten the connectors, because these tools may damage the connectors.

## 6-3 Maintenance Information Window

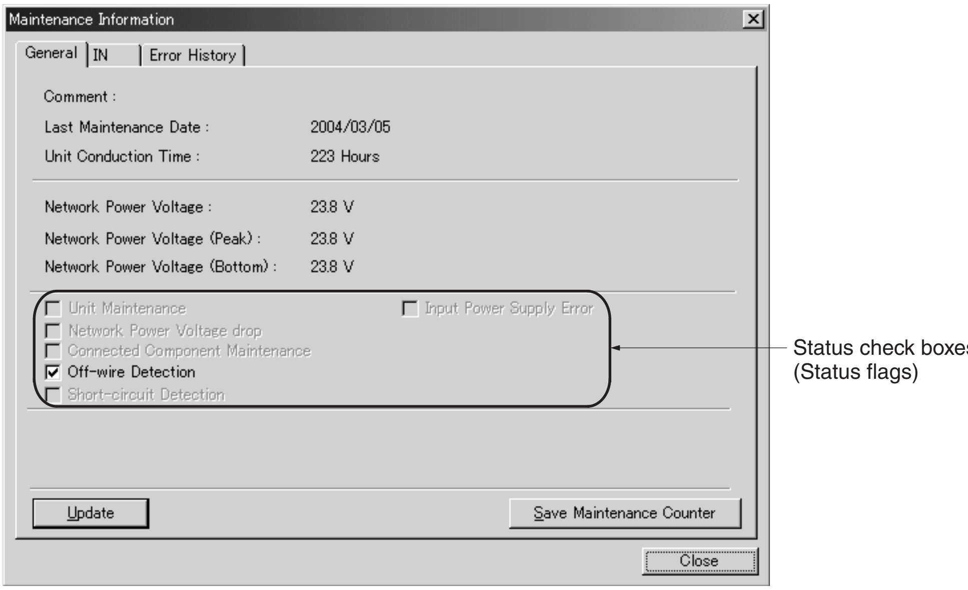
This section describes the Maintenance Information Window, which can be used to check the status of Environment-resistive Slaves. The Monitor Device Window can be used to check the same Slave status information, but the examples in this section uses the Maintenance Information Window. Refer to *4-1-2 Maintenance Mode Window* for details on the differences between the Maintenance Information Window and the Monitor Device Window.

### 6-3-1 Checking Maintenance Information

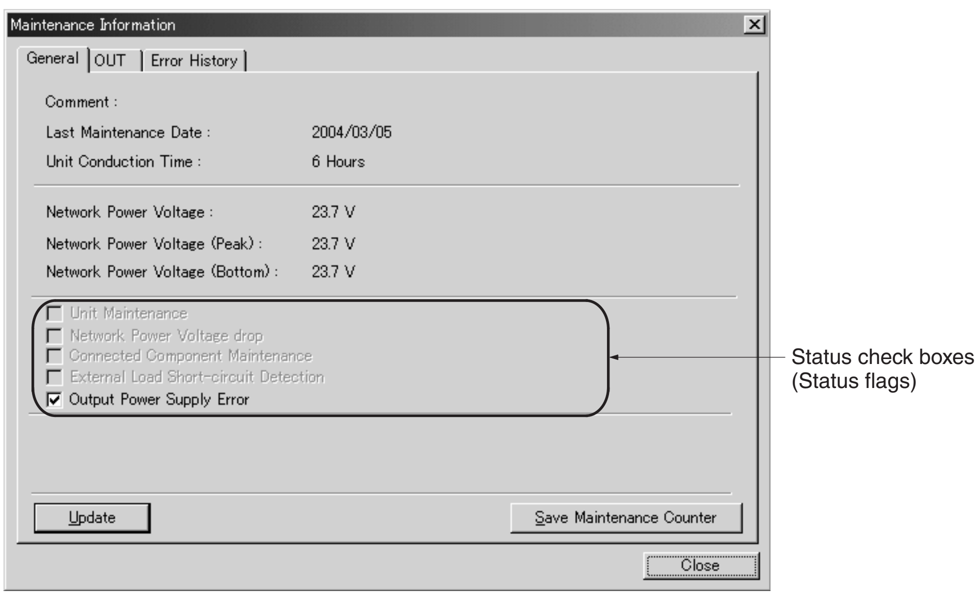
From the DeviceNet Configurator's Main Window, click the right mouse button and select ***Maintenance Information***. (From the Maintenance Mode Window, double-click the icon of the desired Slave.)

## General Window

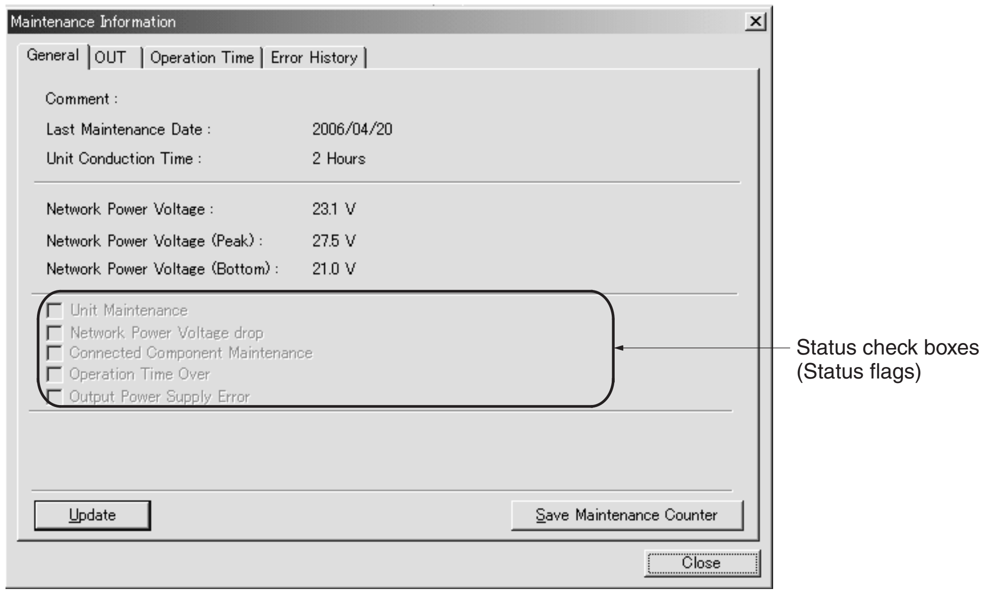
### Window for the DRT2-HD16C(-1) and DRT2-ID08C(-1)



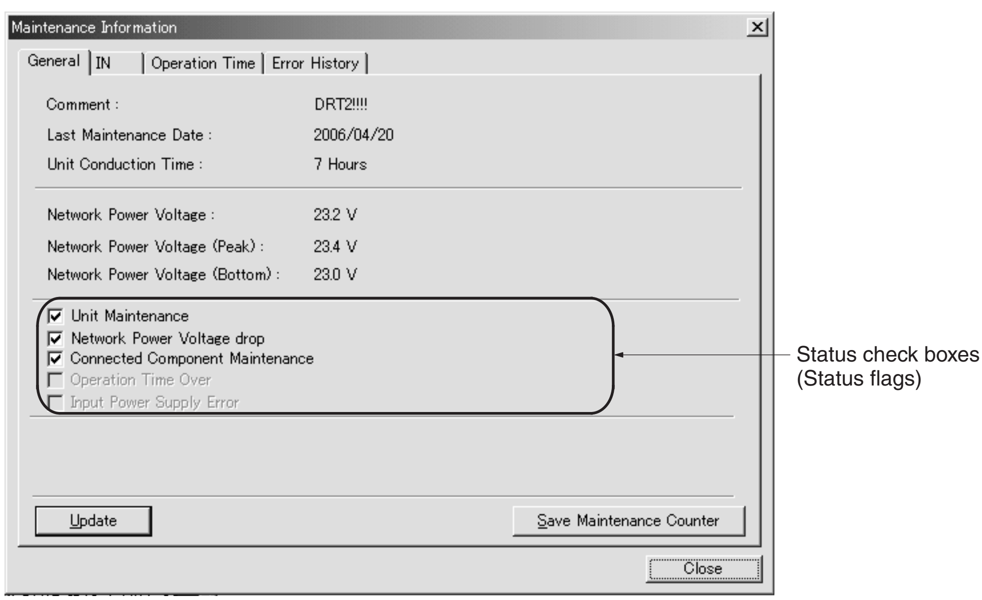

### Window for the DRT2-OD08C(-1)



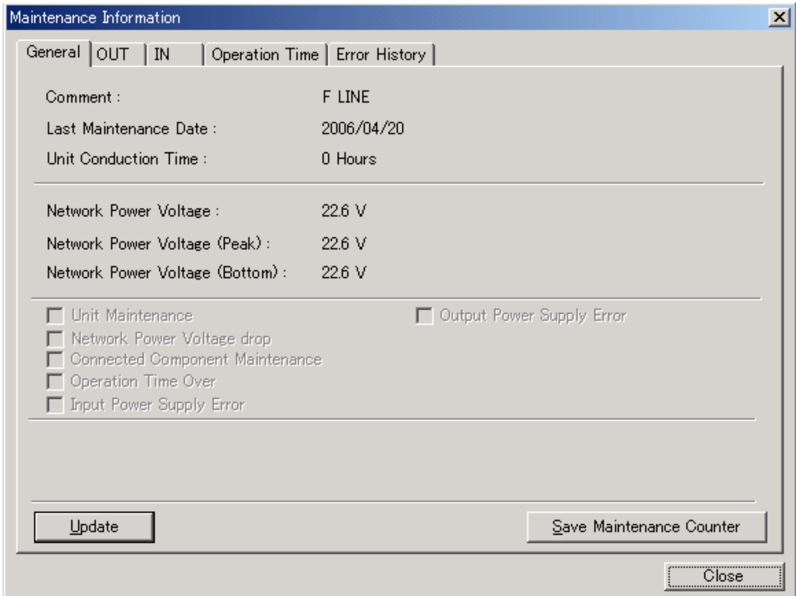
### Window for the DRT2-HD16CL(-1), DRT2-ID08CL(-1), and DRT2-ID04CL(-1)




### Window for the DRT2-WD16CL(-1), DRT2-OD08CL(-1), and DRT2-OD04CL(-1)



### Window for the DRT2-MD16CL(-1)




| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the Unit comment. |
| Last Maintenance Date | Displays the last maintenance date that was set. |
| Unit Conduction Time | Displays the total time that the Unit has been ON (cumulative power ON time). |
| Network Power Voltage | Displays the present network power supply voltage. |
| Network Power Voltage (Peak) | Displays the maximum power supply voltage up to the present time. |
| Network Power Voltage (Bottom) | Displays the minimum power supply voltage up to the present time. |
| Update Button | Click this Button to update the Maintenance information. |
| Save Maintenance Counter | This function saves the Maintenance counter value in the Unit. If this function is used, the previous value will be retained when the power supply is turned OFF and ON again. |

**Note** Always update the information when the parameters have been edited or set.

**Status Check Boxes**

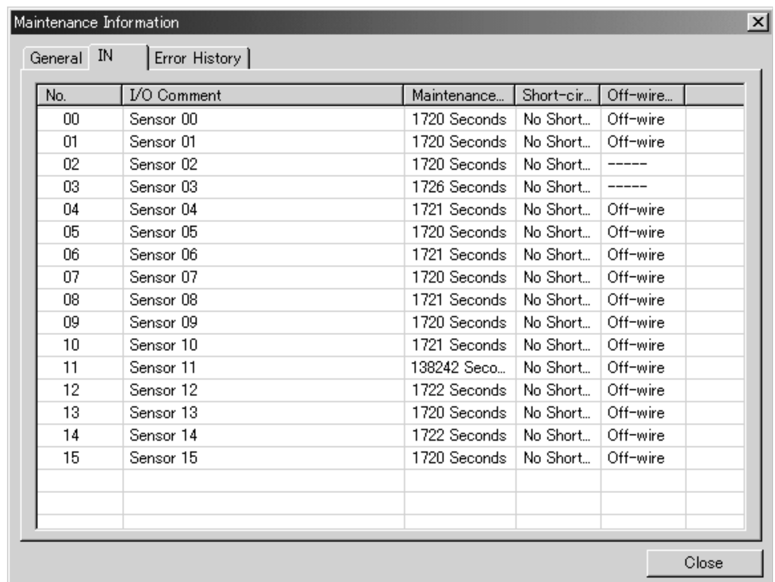
The flags (check boxes) shown in the following table will be turned ON when the corresponding error occurs.

| Item | Description |
|---|---|
| Unit Maintenance | ON when the total Unit ON time exceeds the set value. |
| Network Power Voltage Drop | ON when the network power supply voltage falls below the set value. |
| Connected Device Maintenance | ON when any I/O point's Total ON Time Monitor or Contact Operation Counter exceeds its user-set monitor value. |
| Sensor Disconnected Detection (Advanced Slaves only) | ON when the Sensor Disconnection Detection function detects a disconnection in an input. |

| Item | Description |
|---|---|
| Sensor Power Short-circuit Detection (Advanced Slaves only) | ON when the Sensor Power Short-circuit Detection function detects a short circuit in a sensor power supply. |
| External Load Short-circuit Detection (Advanced Slaves only) | ON when the External Load Short-circuit Detection function detects a short circuit in an output load. |
| I/O Power Supply Error (Output) | ON when the output power supply is OFF. |
| I/O Power Supply Error (Input) | ON when the input power supply is OFF. |

## Tabs in the Maintenance Information WIndow

**IN Tab Page** Terminals are listed in numerical order.

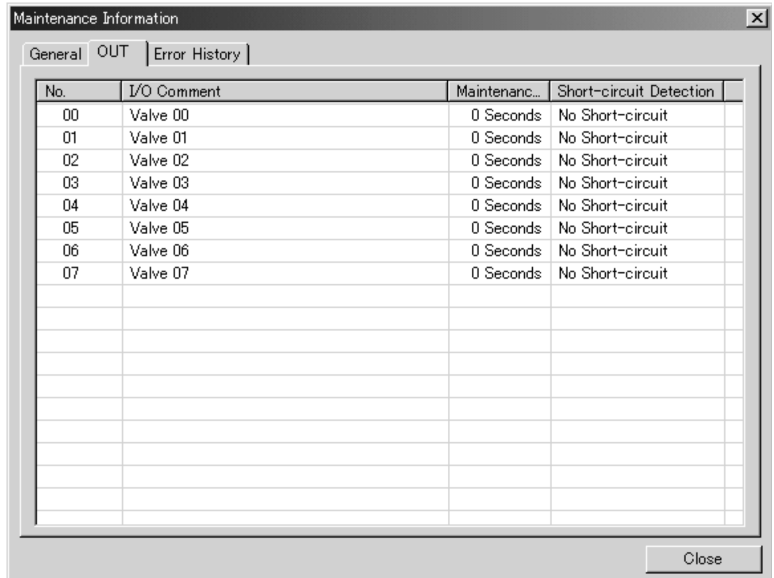



| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the input comment for each input. |
| Maintenance Counter | Displays the maintenance counter for each input. If the maintenance counter exceeds the threshold value, a warning icon will be displayed on the left side of the input's No. column.<br>Total ON Time Monitor: Units = seconds<br>Contact Operation Counter: Units = operations |
| Power Supply Short-circuit | When sensor power short-circuit detection is ON for each input, *Shorted* will be displayed. |
| Disconnection Detection History | Records information when a disconnection occurred even once. |

**Note** Power Supply Short-circuit and Disconnection Error History are supported for Advanced Slaves only.

**OUT Tab Page**

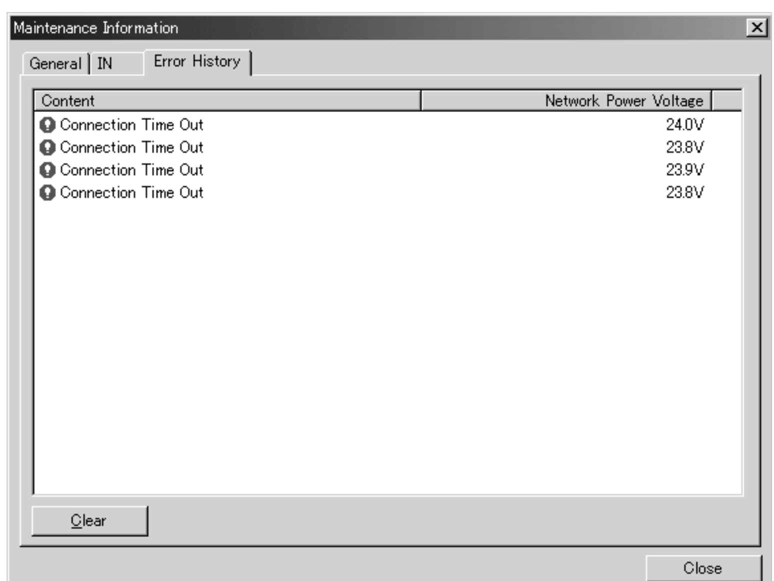
Terminals are listed in numerical order.




| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the output comment for each output. |
| Maintenance Counter | Displays the maintenance counter for each output. If the maintenance counter exceeds the threshold value, a warning icon will be displayed on the left side of the output's No. column.<br>Total ON Time Monitor: Units = seconds<br>Contact Operation Counter: Units = operations |
| External Load Short-circuit Detection | If a load short circuit is detected, *Shorted* will be displayed. |

**Note** Load Short-circuit Detection is supported for Advanced Slaves only.

**Error History Tab Page**



| Item | Description |
|---|---|
| Content | Displays the contents of the communications errors that occurred. |
| Network Power Voltage | Displays the power supply voltage being supplied when the error occurred. |
| Clear Button | Clears the error history. |

# 6-4 Advanced Environment-resistive Terminals

## 6-4-1 Node Address, Baud Rate, and Output Hold/Clear Settings

This section describes the Environment-resistive Terminal's node address setting, baud rate settings, and hold/clear outputs for communications error setting. These settings are made as follows:

Node address setting: Rotary switches

Baud rate setting: Automatic follow-up

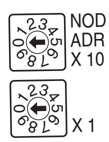
Output hold/clear setting: Software switch

### Node Address Settings

The node address of the Environment-resistive Terminal is set as a decimal, using the top rotary switch for the ten's digit, and the bottom rotary switch for the one's digit.

Any node address within the setting range can be used as long as it is not already set for another node.

Refer to *SECTION 5 General-purpose Slaves* for details on setting from the Configurator.




**Note**
1. Setting the same node address for more than one node will cause a node address duplication error and communications will not start.
2. Always turn OFF the power (including the communications power supply) to the Slave before setting.

### Baud Rate Setting

The baud rate of the whole system is determined by the baud rate set for the Master Unit. Setting the baud rate for each Unit is not required.

### Output Hold/Clear Setting

Use the Configurator to set the output hold/clear settings. The factory setting is for outputs to be cleared. Refer to *SECTION 5 General-purpose Slaves* for setting details.

## 6-4-2 Environment-resistive Terminals with 8 Transistor Inputs (IP67): DRT2-ID08C (NPN) and DRT2-ID08C-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID08C | DRT2-ID08C-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points (uses one word in the Master) | |

| Item | Specifications | |
|---|---|---|
| ON voltage | 9 V DC min. (between each input terminal and V) | 9 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 3 mA min./point (at 11 V DC)<br>11 mA max./point (at 24 V DC) | |
| Sensor power supply voltage | Maximum communications power supply voltage: +0 V<br>Minimum communications power supply voltage: –1.5 V | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## I/O Status Indicators

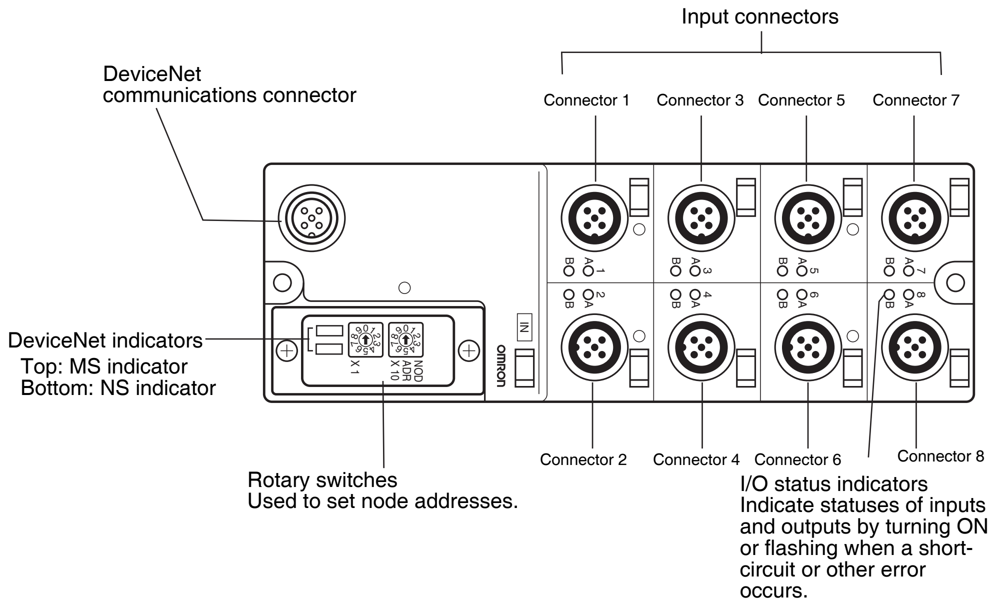
The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| | Red | ON | The sensor power of connector 1 has shorted. |
| | Red | Flashing | The sensor of connector 1 is disconnected. |
| 2-A | Yellow | ON | Input 1 is ON. |
| | Red | ON | The sensor power of connector 2 has shorted. |
| | Red | Flashing | The sensor of connector 2 is disconnected. |
| 3-A | Yellow | ON | Input 2 is ON. |
| | Red | ON | The sensor power of connector 3 has shorted. |
| | Red | Flashing | The sensor of connector 3 is disconnected. |
| 4-A | Yellow | ON | Input 3 is ON. |
| | Red | ON | The sensor power of connector 4 has shorted. |
| | Red | Flashing | The sensor of connector 4 is disconnected. |
| 5-A | Yellow | ON | Input 4 is ON. |
| | Red | ON | The sensor power of connector 5 has shorted. |
| | Red | Flashing | The sensor of connector 5 is disconnected. |
| 6-A | Yellow | ON | Input 5 is ON. |
| | Red | ON | The sensor power of connector 6 has shorted. |
| | Red | Flashing | The sensor of connector 6 is disconnected. |
| 7-A | Yellow | ON | Input 6 is ON. |
| | Red | ON | The sensor power of connector 7 has shorted. |
| | Red | Flashing | The sensor of connector 7 is disconnected. |
| 8-A | Yellow | ON | Input 7 is ON. |
| | Red | ON | The sensor power of connector 8 has shorted. |
| | Red | Flashing | The sensor of connector 8 is disconnected. |

**Note** 1. The I/O status indicator "B" is not used by Units with 8 inputs.

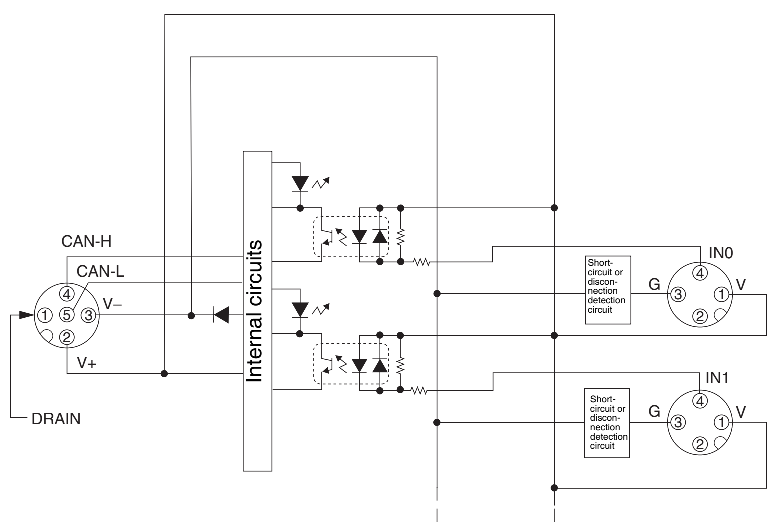
2. Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7. (The input bits are also numbered from 0 to 7 in the Configurator display.)

## Component Names and Functions: DRT2-ID08C and DRT2-ID08C-1

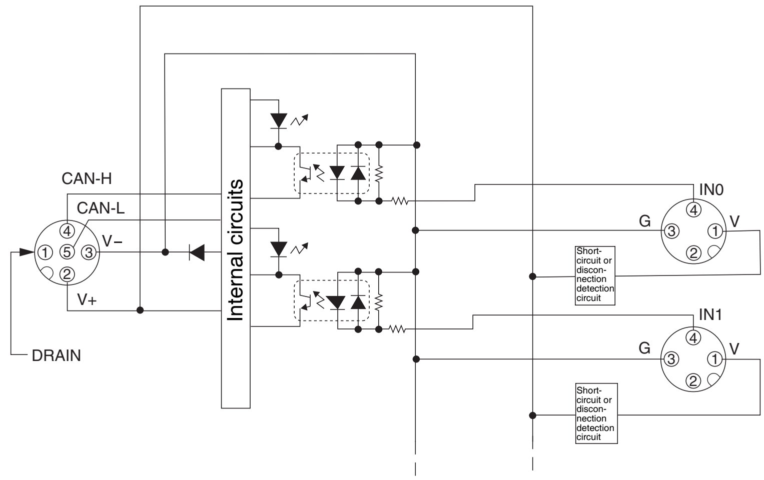



## Internal Circuits

### DRT2-ID08C (NPN)

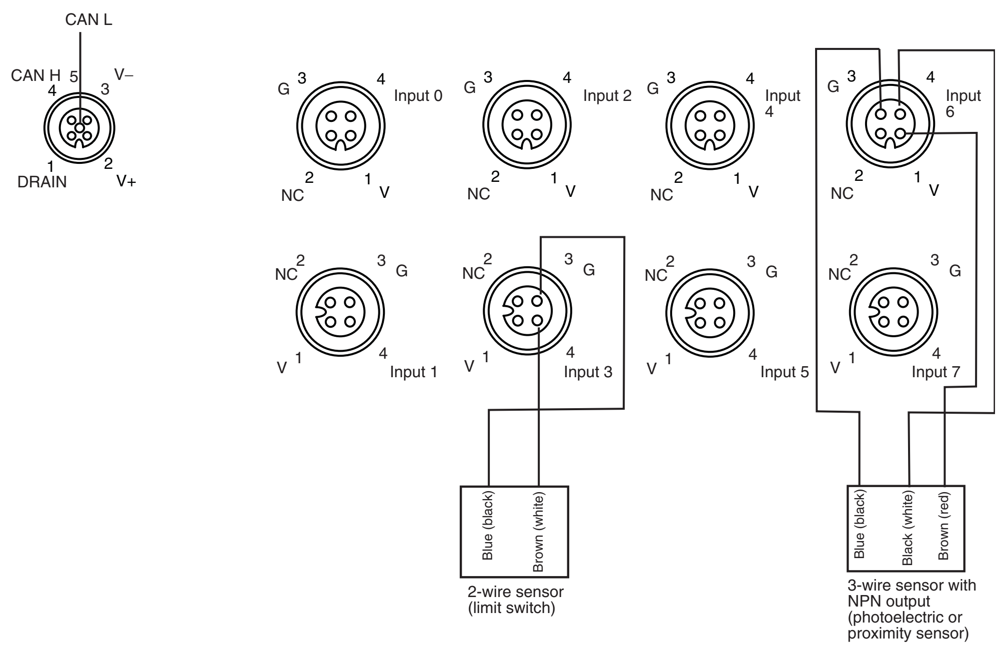


### DRT2-ID08C-1 (PNP)

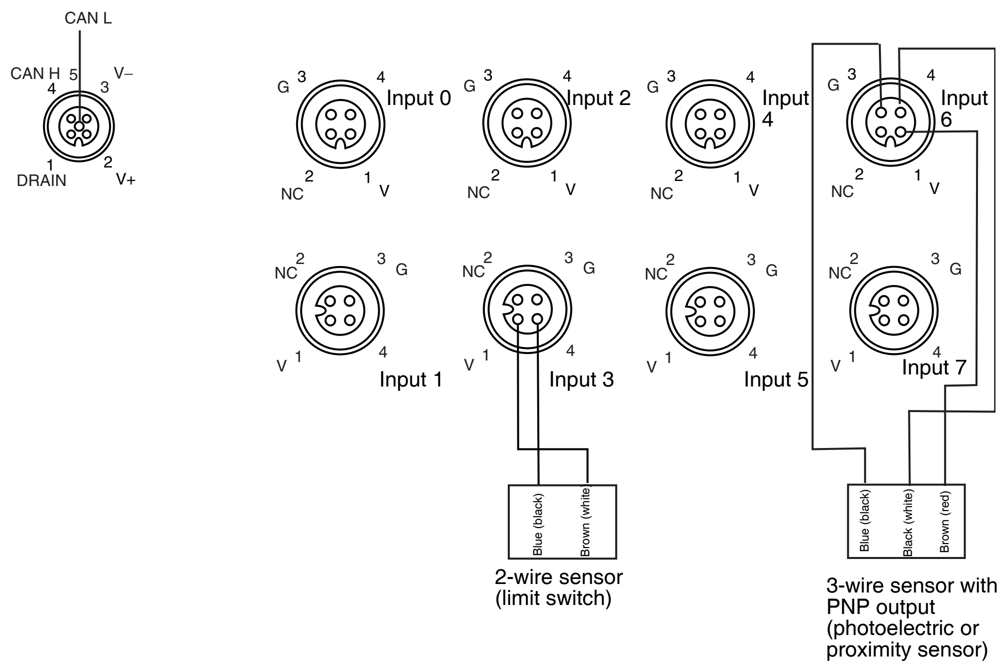



## Wiring

### DRT2-ID08C (NPN)



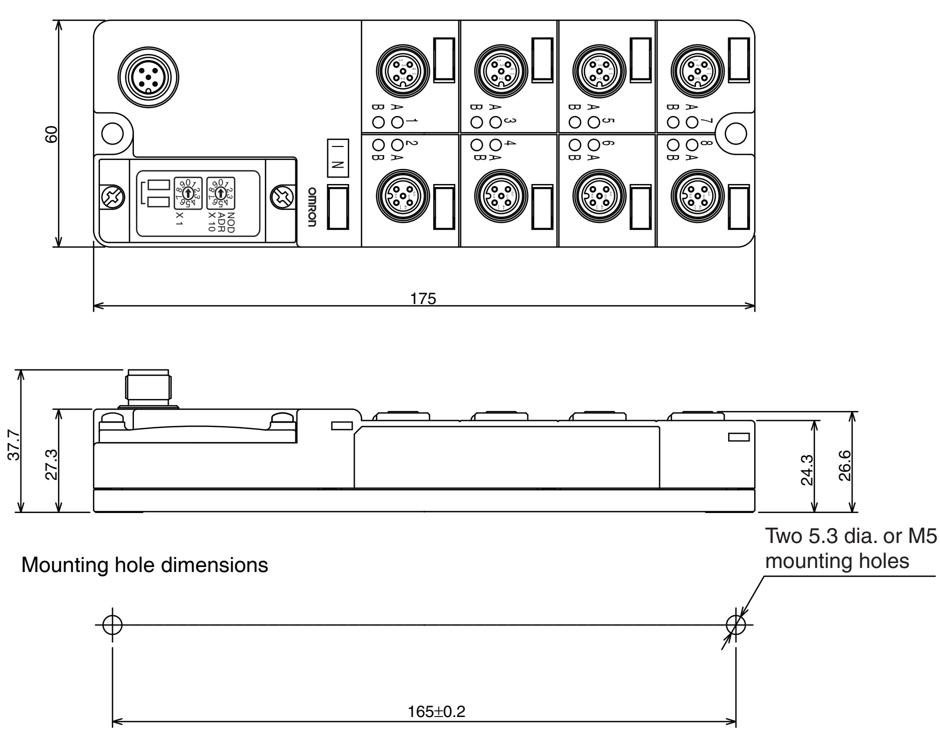
**DRT2-ID08C-1 (PNP)**




**Note** 1. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

2. The minimum sensor power supply voltage is a communications power supply voltage of -1.5 V. Confirm the rated power supply voltage of the connected sensors when selecting the power supply. Refer to *Appendix E Current Consumption Summary* before setting the communications power supply voltage.

## Dimensions: DRT2-ID08C and DRT2-ID08C-1



## 6-4-3 Environment-resistive Terminals with 16 Transistor Inputs (IP67): DRT2-HD16C (NPN) and DRT2-HD16C-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-HD16C | DRT2-HD16C-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 9 V DC min. (between each input terminal and V) | 9 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 3 mA min./point (at 11 V DC)<br>11 mA max./point (at 24 V DC) | |
| Sensor power supply voltage | Maximum communications power supply voltage: +0 V<br>Minimum communications power supply voltage: –1.5 V | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

### I/O Status Indicators

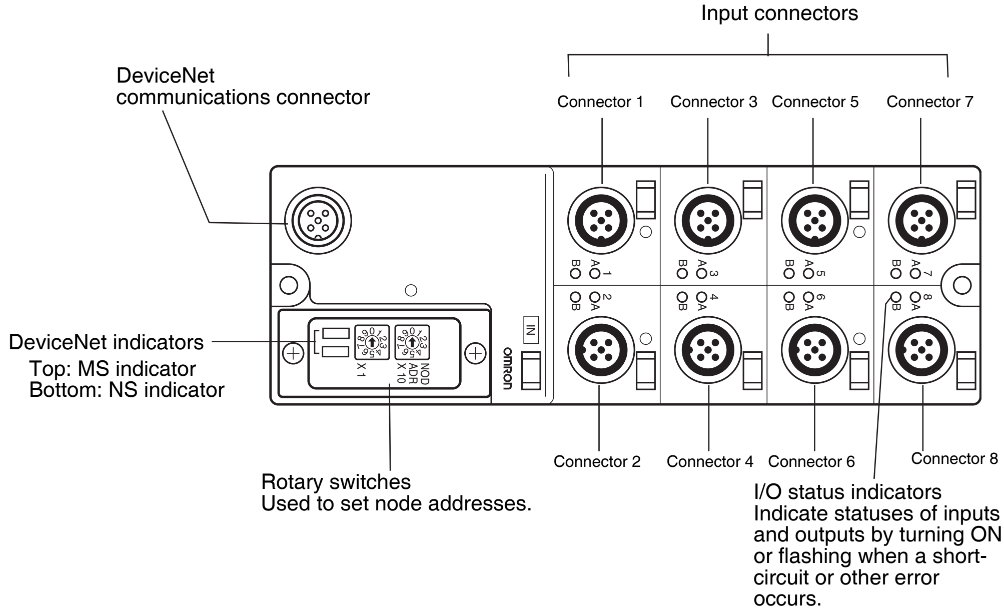
The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of parts and functions for details on the location of the I/O status indicators. In the indicator name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| | Red | ON | The sensor power of connector 1 has shorted. |
| | Red | Flashing | The sensor of connector 1 is disconnected. |
| 1-B | Yellow | ON | Input 1 is ON. |
| 2-A | Yellow | ON | Input 2 is ON. |
| | Red | ON | The sensor power of connector 2 has shorted. |
| | Red | Flashing | The sensor of connector 2 is disconnected. |
| 2-B | Yellow | ON | Input 3 is ON. |
| 3-A | Yellow | ON | Input 4 is ON. |
| | Red | ON | The sensor power of connector 3 has shorted. |
| | Red | Flashing | The sensor of connector 3 is disconnected. |
| 3-B | Yellow | ON | Input 5 is ON. |

| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 4-A | Yellow | ON | Input 6 is ON. |
| | Red | ON | The sensor power of connector 4 has shorted. |
| | Red | Flashing | The sensor of connector 4 is disconnected. |
| 4-B | Yellow | ON | Input 7 is ON. |
| 5-A | Yellow | ON | Input 8 is ON. |
| | Red | ON | The sensor power of connector 5 has shorted. |
| | Red | Flashing | The sensor of connector 5 is disconnected. |
| 5-B | Yellow | ON | Input 9 is ON. |
| 6-A | Yellow | ON | Input 10 is ON. |
| | Red | ON | The sensor power of connector 6 has shorted. |
| | Red | Flashing | The sensor of connector 6 is disconnected. |
| 6-B | Yellow | ON | Input 11 is ON. |
| 7-A | Yellow | ON | Input 12 is ON. |
| | Red | ON | The sensor power of connector 7 has shorted. |
| | Red | Flashing | The sensor of connector 7 is disconnected. |
| 7-B | Yellow | ON | Input 13 is ON. |
| 8-A | Yellow | ON | Input 14 is ON. |
| | Red | ON | The sensor power of connector 8 has shorted. |
| | Red | Flashing | The sensor of connector 8 is disconnected. |
| 8-B | Yellow | ON | Input 15 is ON. |

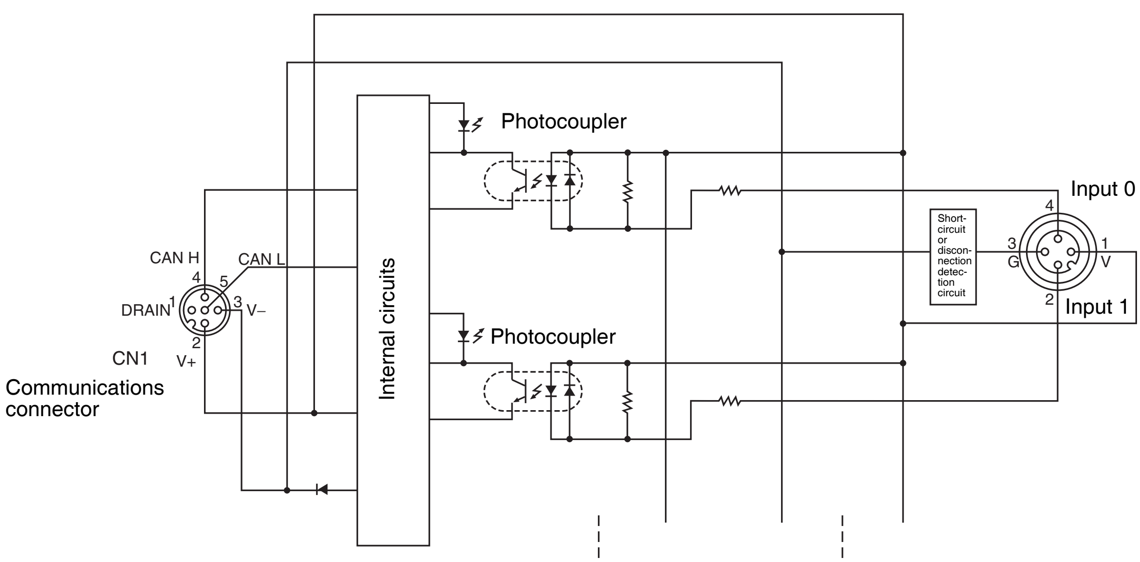
**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7. (The input bits are also numbered from 0 to 7 in the Configurator display.)

## Component Names and Functions: DRT2-HD16C and DRT2-HD16C-1

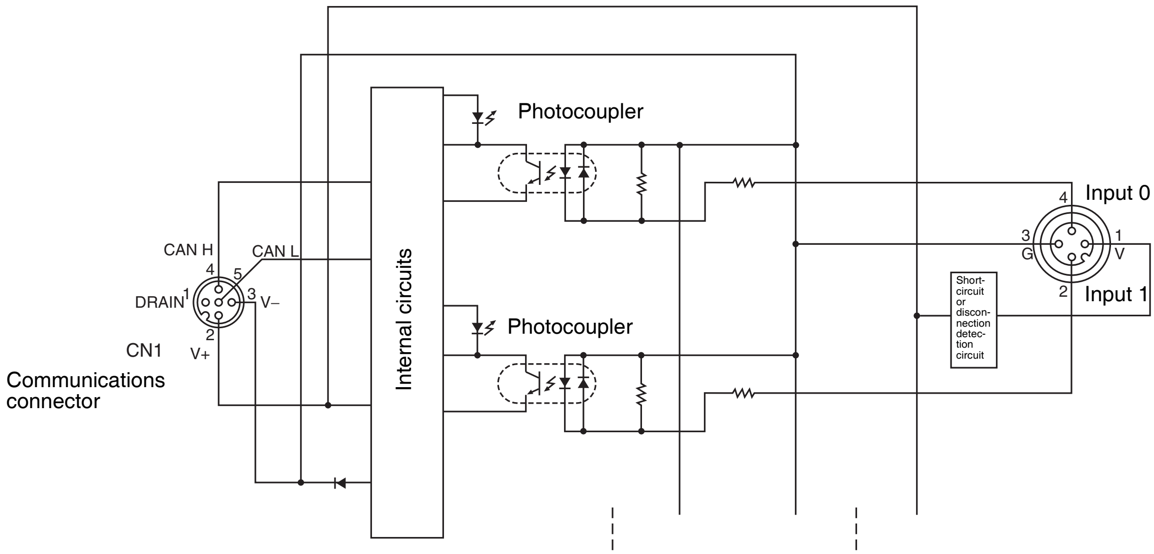



## Internal Circuits

### DRT2-HD16C (NPN)

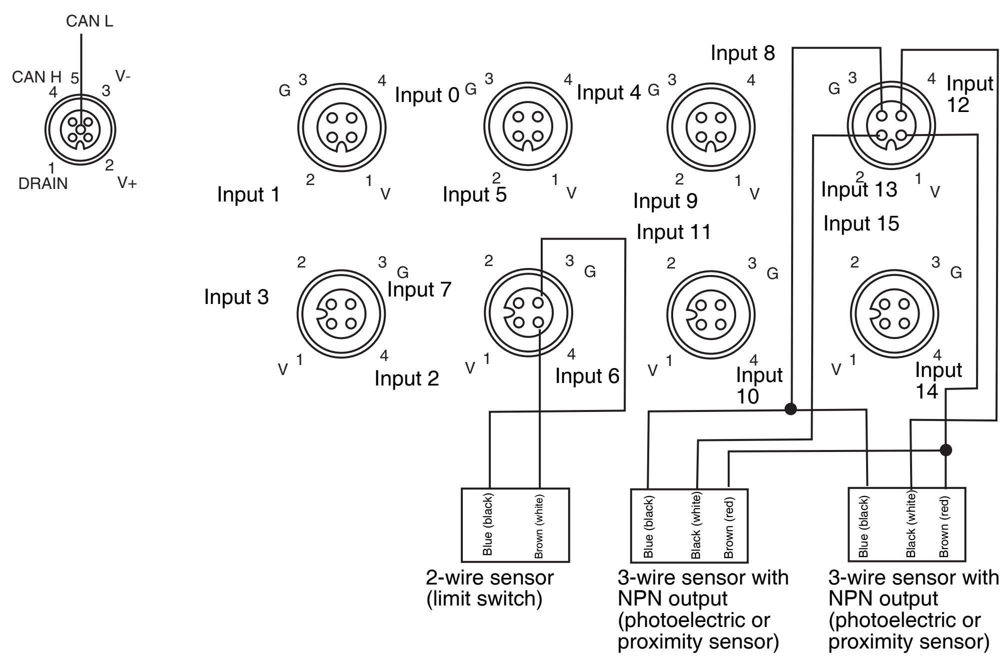


### DRT2-HD16C-1 (PNP)

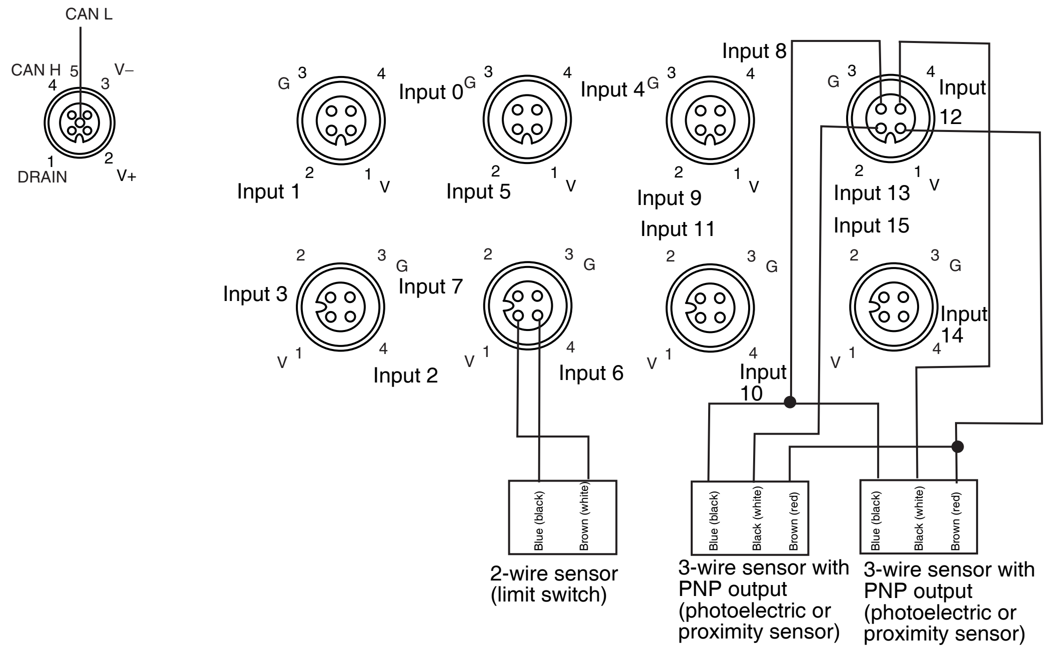



## Wiring

### DRT2-HD16C (NPN)



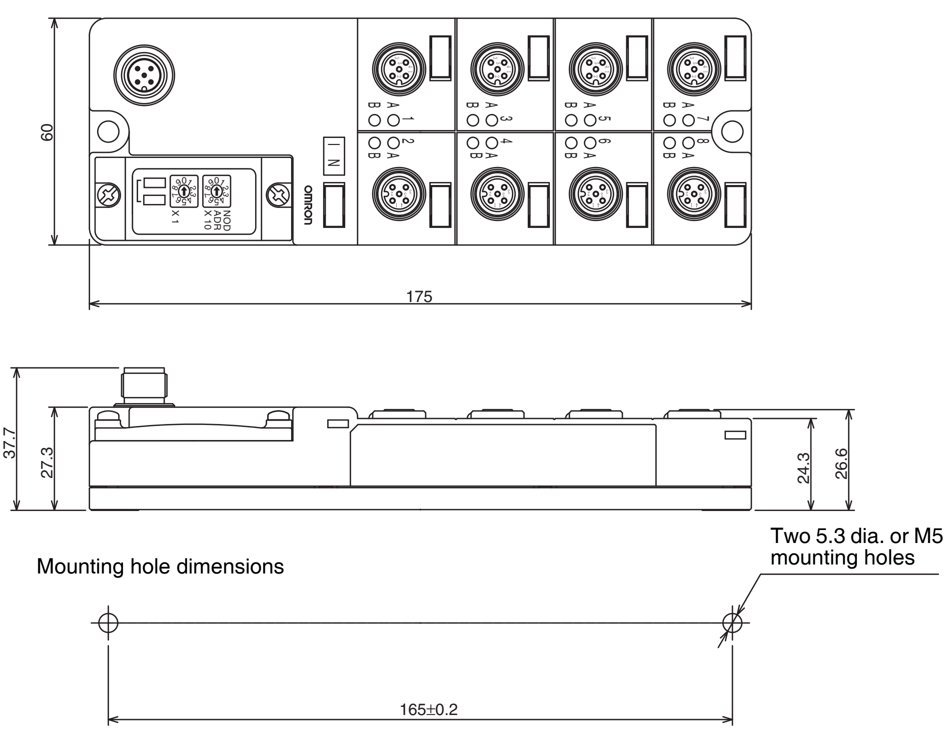
**DRT2-HD16C-1 (PNP)**




**Note** 1. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

2. The minimum sensor power supply voltage is a communications power supply voltage of −1.5 V. Confirm the rated power supply voltage of the connected sensors when selecting a power supply. Refer to *Appendix E Current Consumption Summary* before setting the communications power supply voltage.

## Dimensions: DRT2-HD16C and DRT2-HD16C-1



## 6-4-4 Environment-resistive Terminals with 8 Transistor Outputs (IP67): DRT2-OD08C (NPN) and DRT2-OD08C-1 (PNP)

### Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-OD08C | DRT2-OD08C-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output current | 1.5 A/point, 8.0 A/common | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, −15 to +10%) | |
| Residual voltage | 1.2 V max. (at 1.5 A between each output terminal and G) | 1.2 V max. (at 1.5 A between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Status Indicators

#### I/O Status Indicators

The I/O status indicator displays and their meanings are shown in the following table. Refer to the following section on names of components and functions for details on the location of the I/O status indicators. In the indicator name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

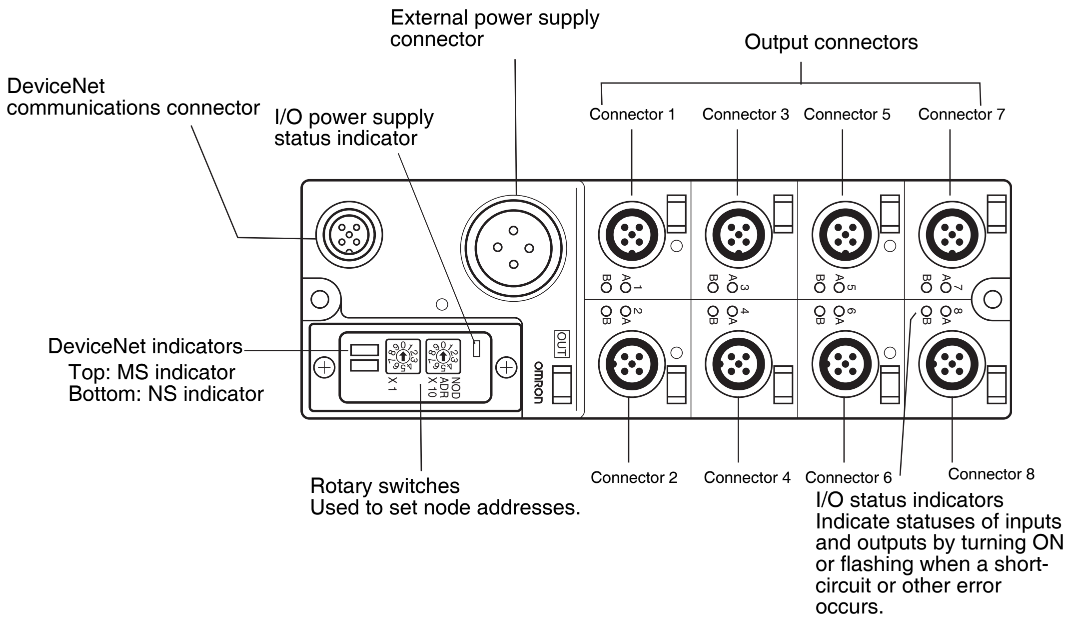
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Output 0 is ON. |
| 1-B | Red | ON | The load of output 0 has shorted. |
| 2-A | Yellow | ON | Output 1 is ON. |
| 2-B | Red | ON | The load of output 1 has shorted. |
| 3-A | Yellow | ON | Output 2 is ON. |
| 3-B | Red | ON | The load of output 2 has shorted. |
| 4-A | Yellow | ON | Output 3 is ON. |
| 4-B | Red | ON | The load of output 3 has shorted. |
| 5-A | Yellow | ON | Output 4 is ON. |
| 5-B | Red | ON | The load of output 4 has shorted. |
| 6-A | Yellow | ON | Output 5 is ON. |
| 6-B | Red | ON | The load of output 5 has shorted. |
| 7-A | Yellow | ON | Output 6 is ON. |
| 7-B | Red | ON | The load of output 6 has shorted. |
| 8-A | Yellow | ON | Output 7 is ON. |
| 8-B | Red | ON | The load of output 7 has shorted. |

**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7. (The inputs are also numbered from 0 to 7 in the Configurator displays.)

#### I/O Power Supply Status Indicator

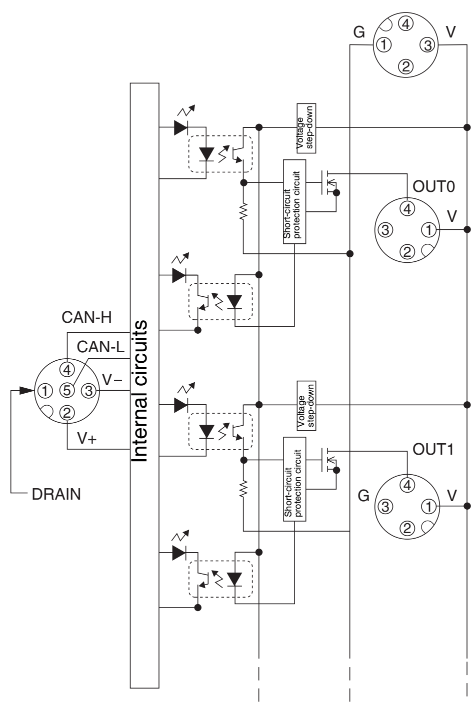
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

## Component Names and Functions: DRT2-OD08C and DRT2-OD08C-1

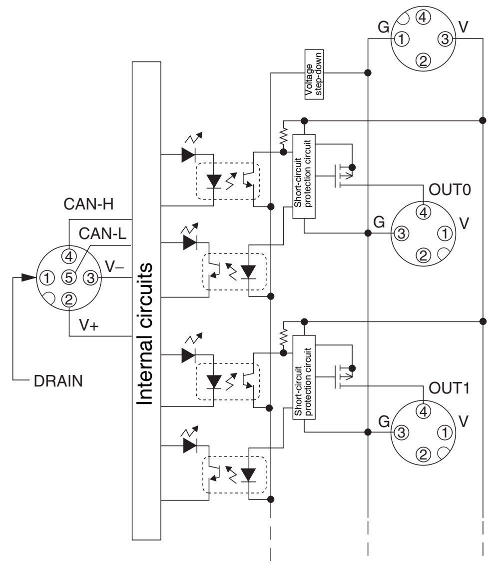



## Internal Circuits

### DRT2-OD08C (NPN)

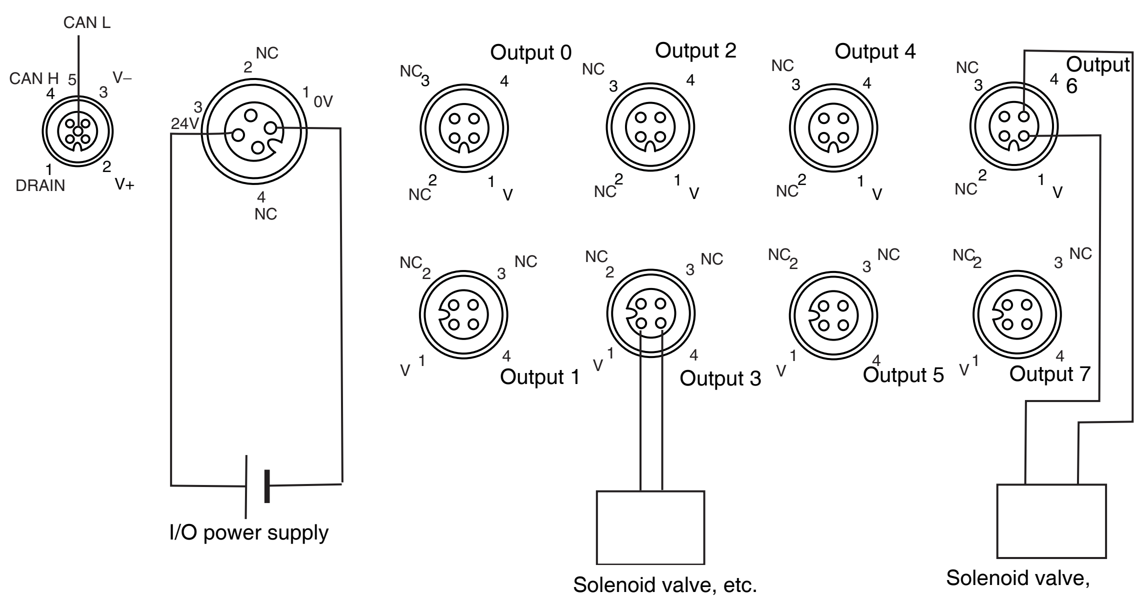


**DRT2-OD08C-1 (PNP)**




## Wiring

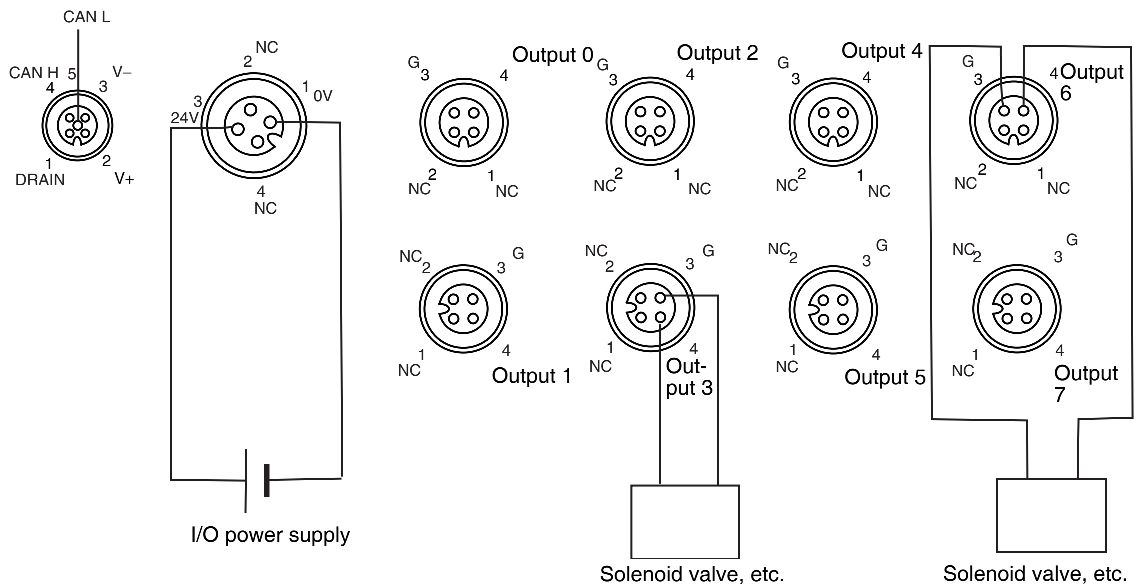
**DRT2-OD08C (NPN)**




**Note**

1. Power cannot be supplied to output devices from output connector G. Supply power to output devices externally.
2. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

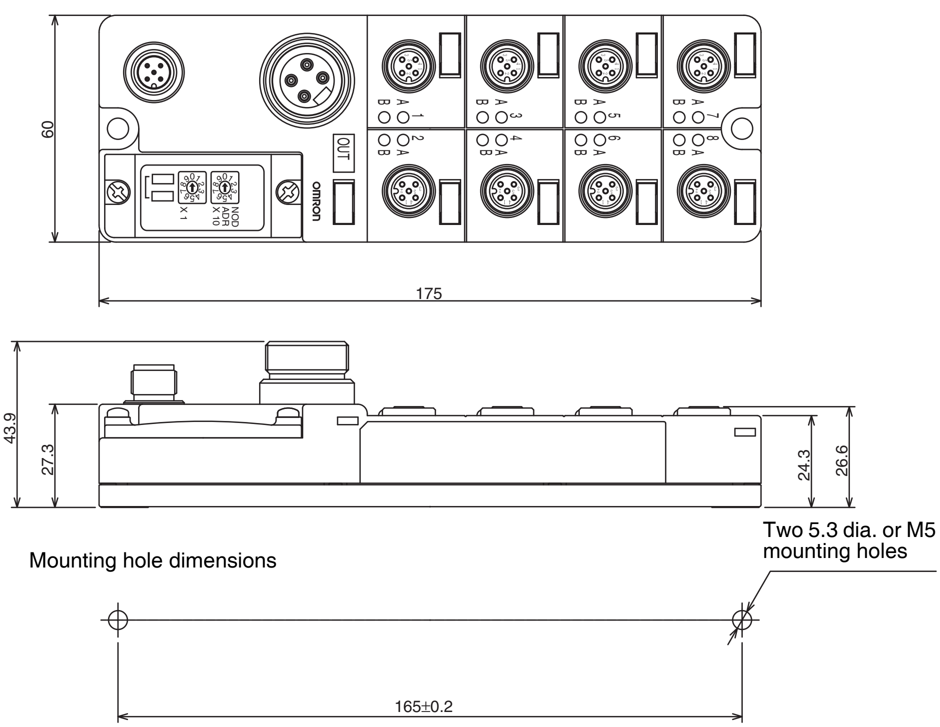
**DRT2-OD08C-1 (PNP)**




**Note** 1. Power cannot be supplied to output devices from output connector V. Supply power to output devices externally.

2. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: DRT2-OD08C and DRT2-OD08C-1



## Load Short-circuit Protection: DRT2-OD08C and DRT2-OD08C-1

Normally, when the output contact (OUT) turns ON, the transistor turns ON, and output current (Iout) flows, as shown in Fig. 1.

If the current limit (Ilim) is exceeded when there is an overload in the output current (Iout) or when a load short-circuit occurs, as shown in Fig. 2 and 3, the output current (Iout) will be limited. Then, if the output transistor junction temperature (Tj) reaches the thermal shutdown temperature (Tstd), the output will be turned OFF to prevent damage to the transistor, the Load Shorted Flag will be turned ON, and the indicator will light red.

In automatic recovery mode (Fig. 2), the short-circuit protection status will be automatically cleared and the output current will start to flow again when the transistor's shutdown temperature (Tj) drops to the reset temperature (Tr).

In manual recovery mode (Fig. 3), the short-circuit protection status will be held even when the transistor's shutdown temperature (Tj) drops to the reset temperature (Tr), and recovery will occur when the Unit is reset by turning OFF the I/O power supply or the Unit's power supply.

**Fig. 1 Normal Operation**

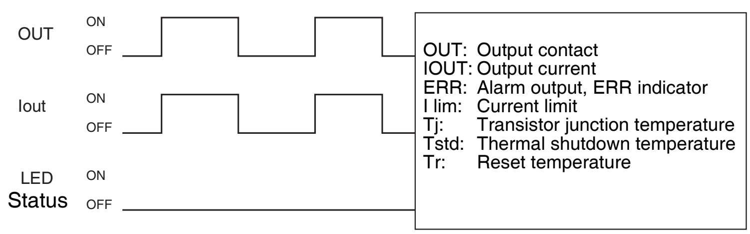



**Fig. 2 Overload or Short-circuit (Automatic Recovery Mode)**

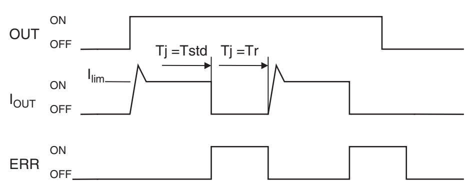
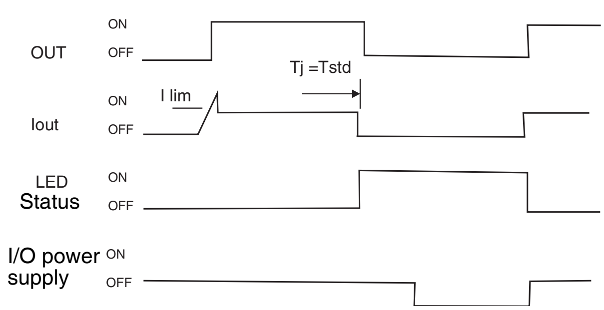



**Fig. 3 Overload or Short-circuit (Manual Recovery Mode)**




## Automatic Recovery Mode Restrictions

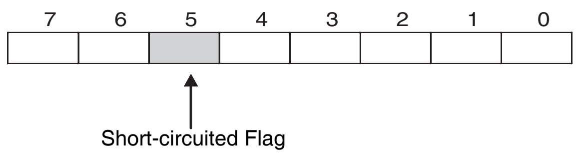
The Unit has load short-circuit protection, but automatic recovery mode is designed to protect the internal circuits specifically from a brief load short-circuit.

In automatic recovery mode, the Unit's load short-circuit protection is automatically cleared when Tj = Tr, as shown in Fig. 2. Therefore, as long as the cause of the short-circuit is not removed, the output's ON/OFF operation will repeat.

If the Unit is left with a short circuit, the internal temperature will rise, causing damage to the Unit. Always remove the cause of an external load short-circuit promptly.

**Note** When an external load short-circuit is detected, the External Load Shorted Flag will turn ON in the Unit's Status Area and the indicator corresponding to the shorted output contact will turn ON. An OR for all contact status will output to the Short-circuited Flag.

When the Load Shorted Flag turns ON, either hold the status of the bit in the user program and program to turn OFF all the Unit's outputs, or use an Explicit message to read the contact that is shorted and turn it OFF. The Short-circuited Flag is allocated in the fifth bit in the Unit's status information area.



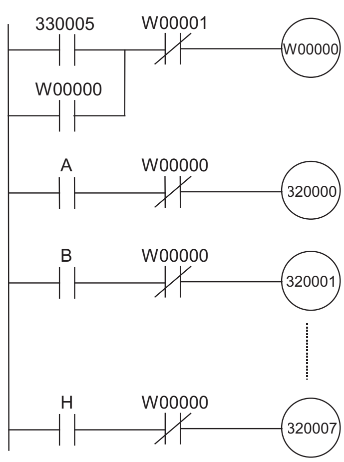

**Programming Example**

In the following programming example, output bits 00 to 07 of CIO 3200 turn OFF when bit 05 of CIO 3300 (Load Shorted Flag) turns ON once. Output bits 00 to 07 of CIO 3200 will not turn ON again until the cause of the short is removed and the outputs are reset by turning ON work bit W00001.

Setting Status

DRT2-OD08C

Node address 00, I/O allocated to CIO 3200, status allocated to CIO 3300.




# 6-5 Standard Environment-resistive Terminals

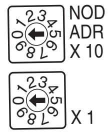
## 6-5-1 Node Address, Baud Rate, and Output Hold/Clear Settings

This section describes the Environment-resistive Terminal's node address setting, baud rate settings, and hold/clear outputs for communications error setting. These settings are made as follows:

Node address setting: Rotary switches

Baud rate setting: Automatic follow-up

Output hold/clear setting: Software switch




**Node Address Settings**

The node address of the Environment-resistive Terminal is set as a decimal, using the top rotary switch for the ten's digit, and the bottom rotary switch for the one's digit.

Any node address within the setting range can be used as long as it is not already set for another node.

Refer to *SECTION 5 General-purpose Slaves* for details on setting from the Configurator.

**Note**

1. Setting the same node address for more than one node will cause a node address duplication error and communications will not start.
2. Always turn OFF the power (including the communications power supply) to the Slave before setting.

**Baud Rate Setting**

The baud rate of the whole system is determined by the baud rate set for the Master Unit. Setting the baud rate for each Unit is not required.

**Output Hold/Clear Setting**

Use the Configurator to set the output hold/clear settings. The factory setting is for outputs to be cleared. Refer to *SECTION 5 General-purpose Slaves* for setting details.

## 6-5-2 Environment-resistive Terminals with 4 Transistor Inputs (IP67): DRT2-ID04CL (NPN) and DRT2-ID04CL-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID04CL | DRT2-ID04CL-1 |
| Internal I/O common | NPN | PNP |
| Input points | 4 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC), 3.0 mA min./point (for 17 V DC) | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 4 points with one common | |

### Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator

name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

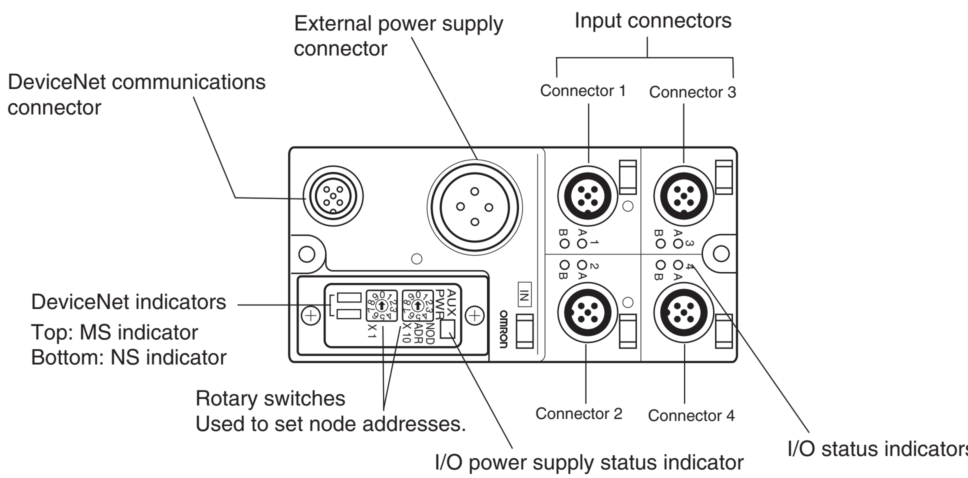
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| 2-A | Yellow | ON | Input 1 is ON. |
| 3-A | Yellow | ON | Input 2 is ON. |
| 4-A | Yellow | ON | Input 3 is ON. |

**Note**
1. The I/O status indicator “B” is not used by Units with 4 inputs.
2. Although the connectors are numbered from 1 to 4, the input bits are numbered from 0 to 3. (The input bits are also numbered from 0 to 7 in the Configurator display.)

**I/O Power Supply Indicator**

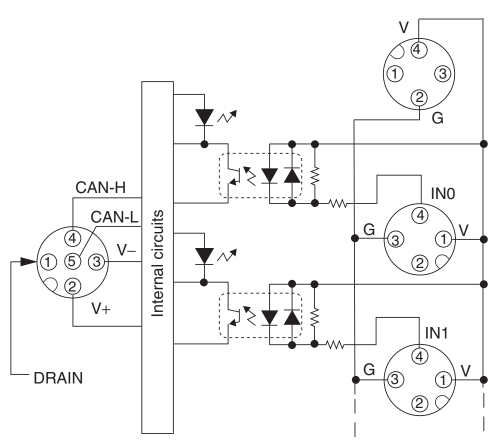
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

### Component Names and Functions: DRT2-ID04CL and DRT2-ID04CL-1

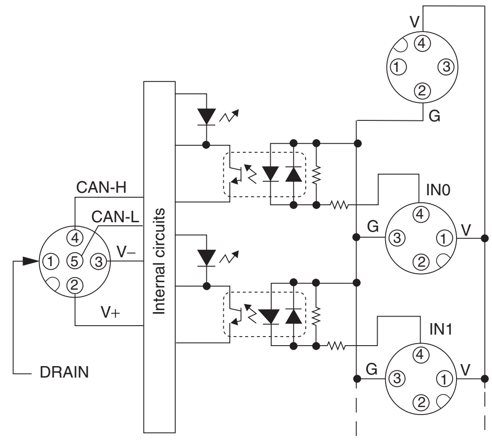



## Internal Circuits

### DRT2-ID04CL (NPN)

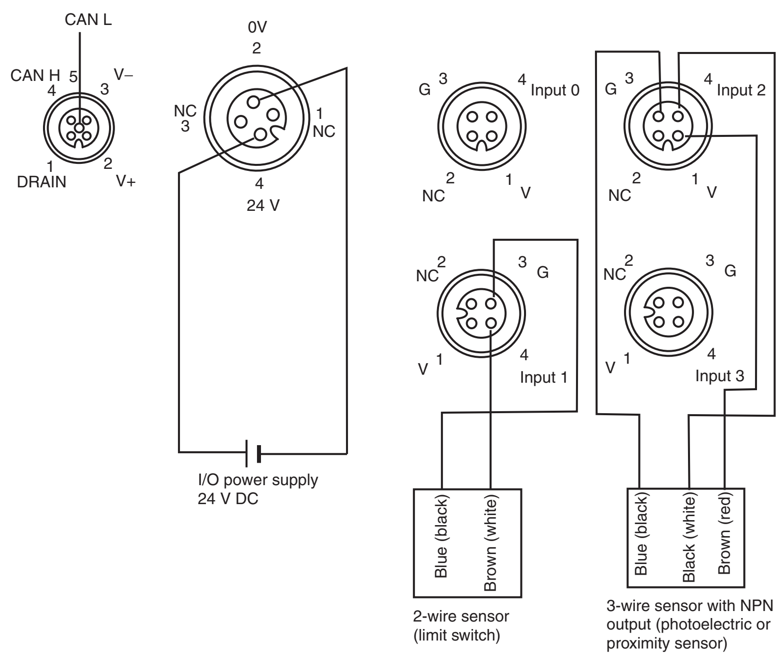


### DRT2-ID04CL-1 (PNP)

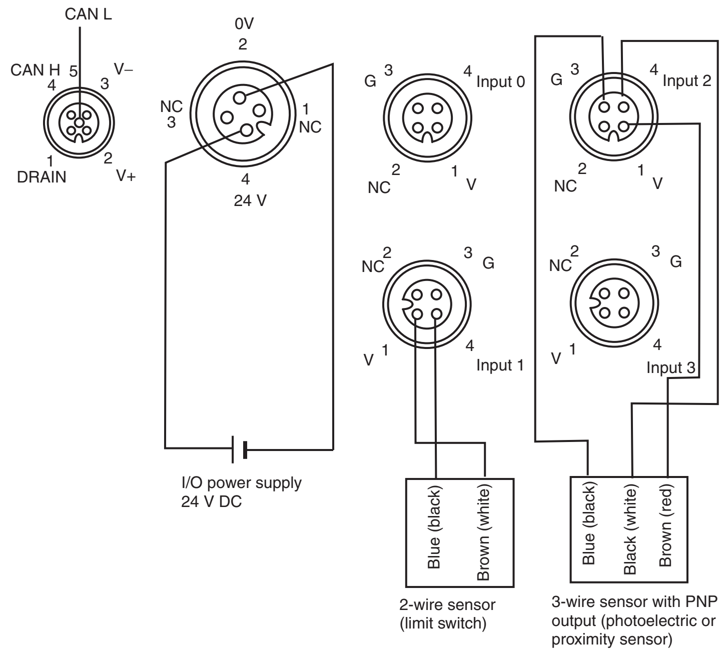



## Wiring

### DRT2-ID04CL (NPN)

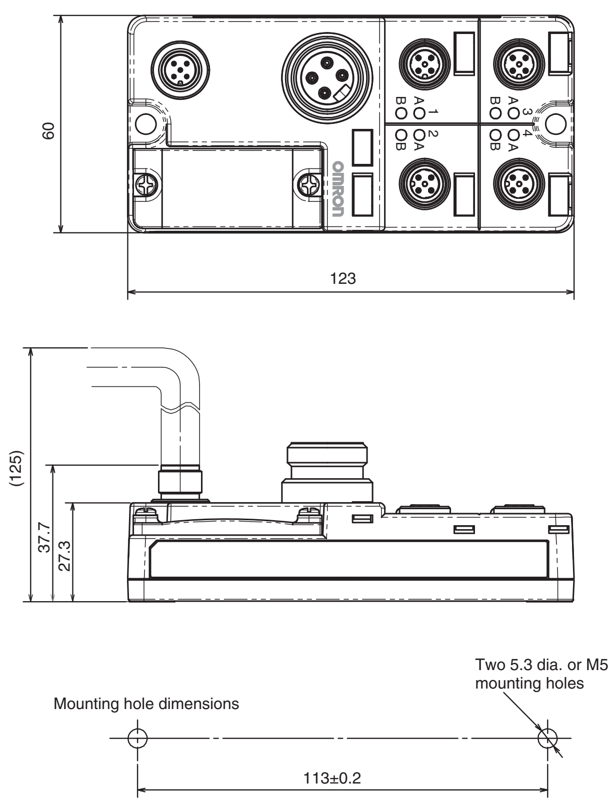


**DRT2-ID04CL-1 (PNP)**




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-ID04CL and DRT2-ID04CL-1



## 6-5-3 Environment-resistive Terminals with 8 Transistor Inputs (IP67): DRT2-ID08CL (NPN) and DRT2-ID08CL-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-ID08CL | DRT2-ID08CL-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC), 3.0 mA min./point (for 17 V DC) | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

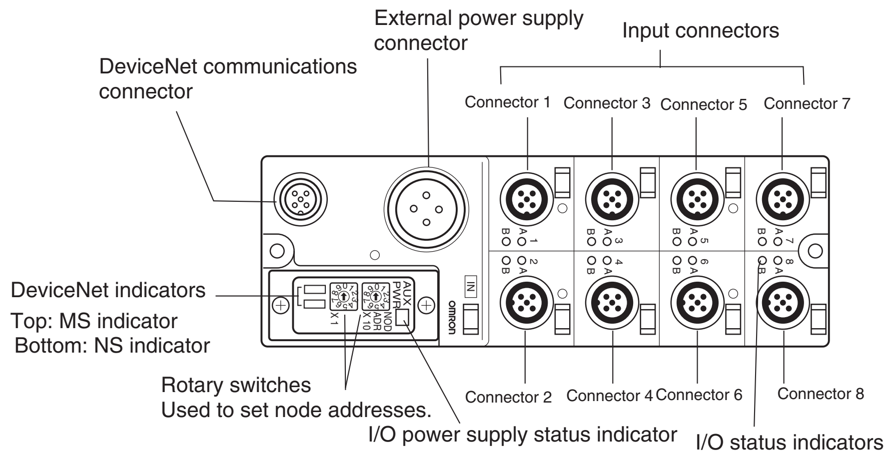
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| 2-A | Yellow | ON | Input 1 is ON. |
| 3-A | Yellow | ON | Input 2 is ON. |
| 4-A | Yellow | ON | Input 3 is ON. |
| 5-A | Yellow | ON | Input 4 is ON. |
| 6-A | Yellow | ON | Input 5 is ON. |
| 7-A | Yellow | ON | Input 6 is ON. |
| 8-A | Yellow | ON | Input 7 is ON. |

**Note**
1. The I/O status indicator “B” is not used by Units with 8 inputs.
2. Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7. (The input bits are also numbered from 0 to 7 in the Configurator display.)

**I/O Power Supply Status Indicator**

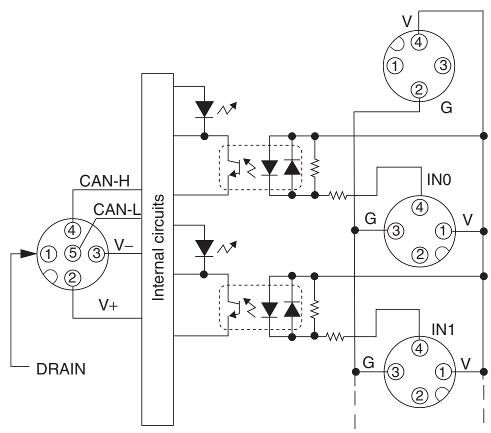
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

### Component Names and Functions: DRT2-ID08CL and DRT2-ID08CL-1

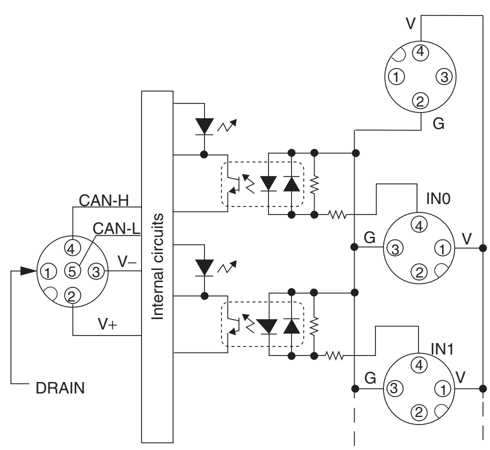



## Internal Circuits

### DRT2-ID08CL (NPN)

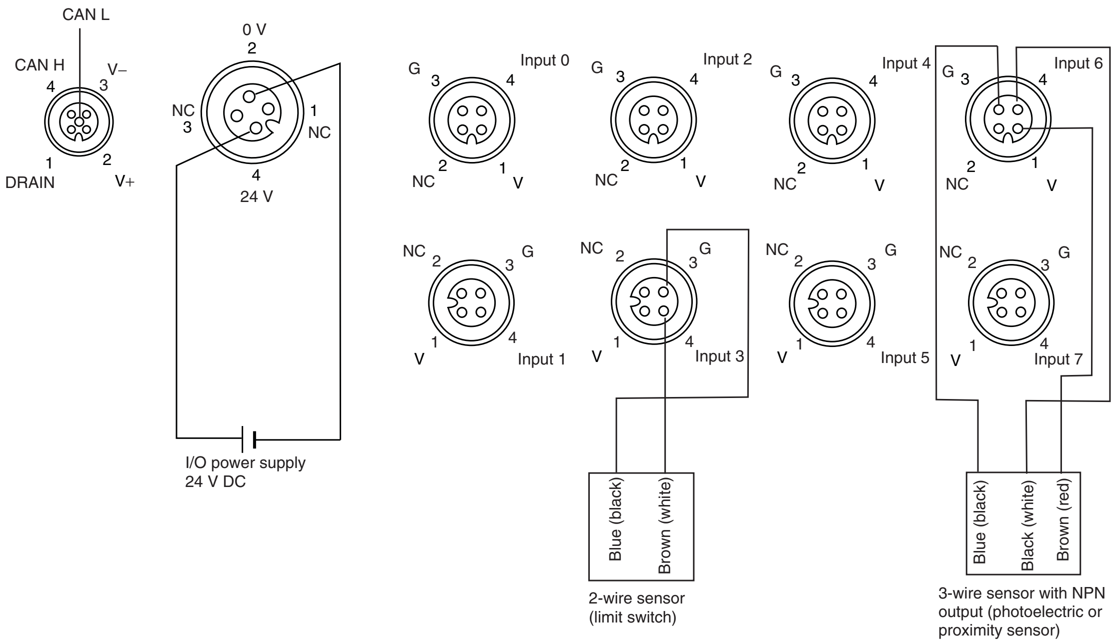



### DRT2-ID08CL-1 (PNP)

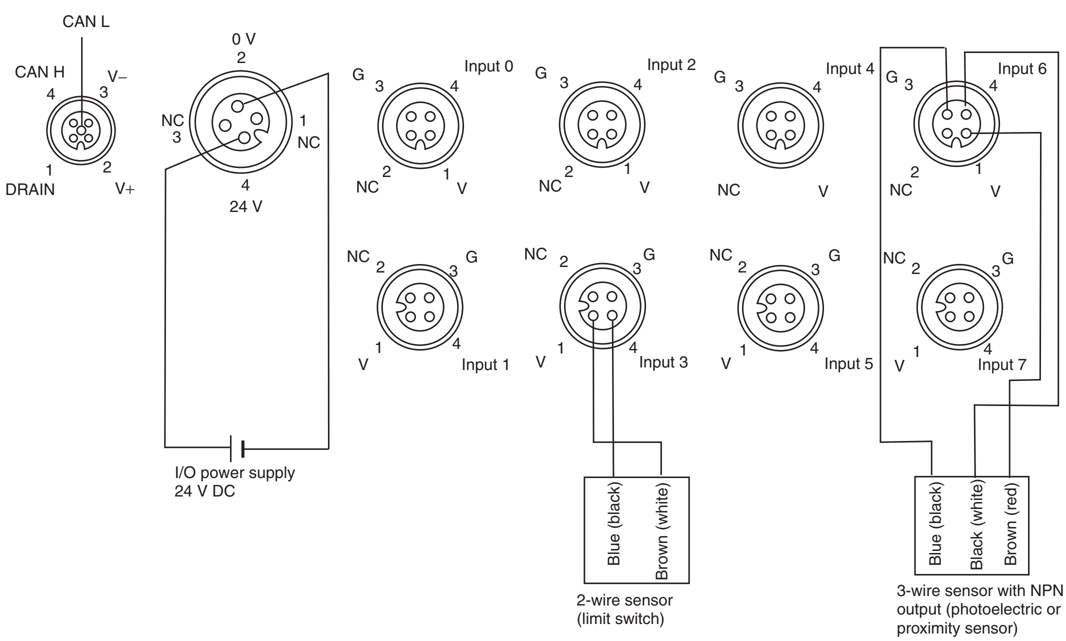


## Wiring

### DRT2-ID08CL (NPN)

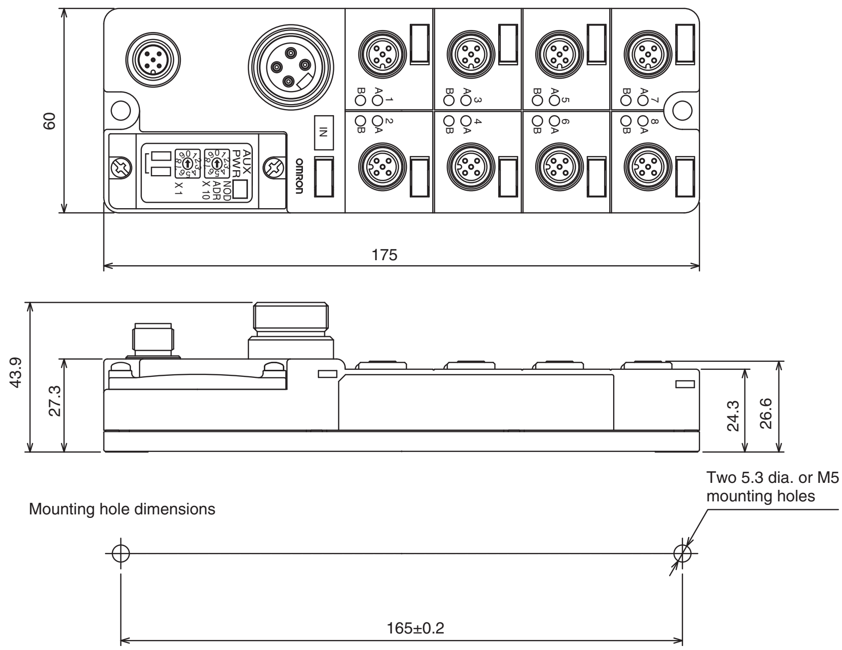



### DRT2-ID08CL-1 (PNP)




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-ID08CL and DRT2-ID08CL-1




# 6-5-4 Environment-resistive Terminals with 16 Transistor Inputs (IP67): DRT2-HD16CL (NPN) and DRT2-HD16CL-1 (PNP)

## Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-HD16CL | DRT2-HD16CL-1 |
| Internal I/O common | NPN | PNP |
| Input points | 16 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC), 3.0 mA min./point (for 17 V DC) | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, −15 to +10%) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator

name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

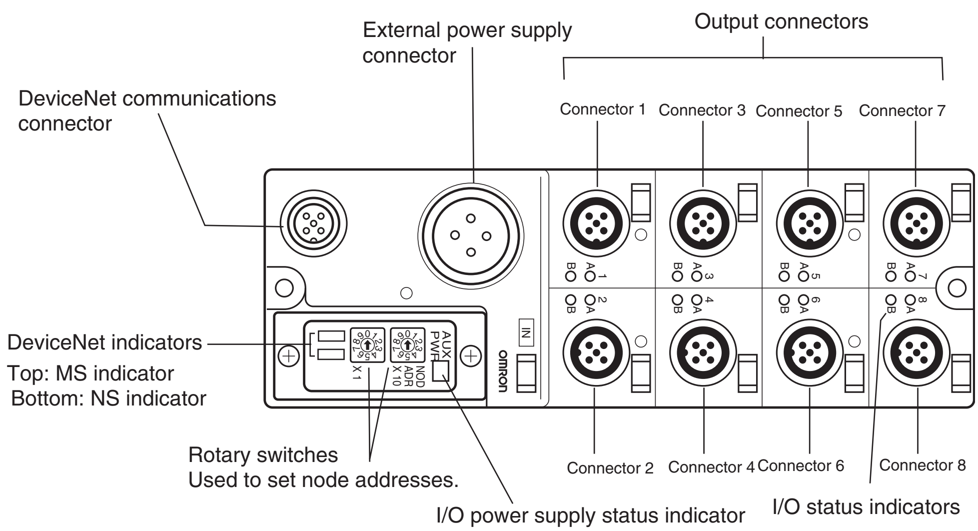
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| 1-B | Yellow | ON | Input 1 is ON. |
| 2-A | Yellow | ON | Input 2 is ON. |
| 2-B | Yellow | ON | Input 3 is ON. |
| 3-A | Yellow | ON | Input 4 is ON. |
| 3-B | Yellow | ON | Input 5 is ON. |
| 4-A | Yellow | ON | Input 6 is ON. |
| 4-B | Yellow | ON | Input 7 is ON. |
| 5-A | Yellow | ON | Input 8 is ON. |
| 5-B | Yellow | ON | Input 9 is ON. |
| 6-A | Yellow | ON | Input 10 is ON. |
| 6-B | Yellow | ON | Input 11 is ON. |
| 7-A | Yellow | ON | Input 12 is ON. |
| 7-B | Yellow | ON | Input 13 is ON. |
| 8-A | Yellow | ON | Input 14 is ON. |
| 8-B | Yellow | ON | Input 15 is ON. |

**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7. (The input bits are also numbered from 0 to 7 in the Configurator display.)

**I/O Power Supply Status Indicator**

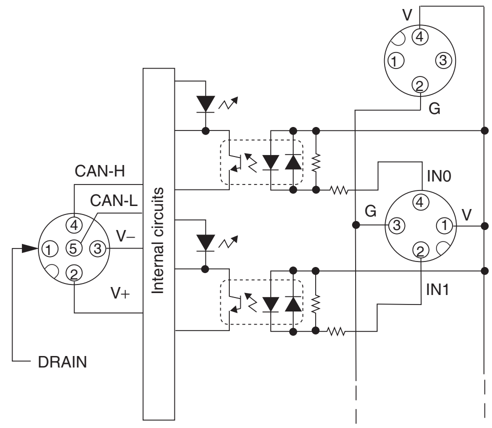
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

## Component Names and Functions: DRT2-HD16CL and DRT2-HD16CL-1

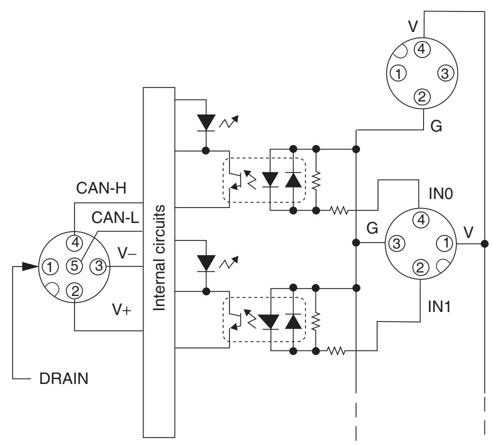


## Internal Circuits

### DRT2-HD16CL (NPN)

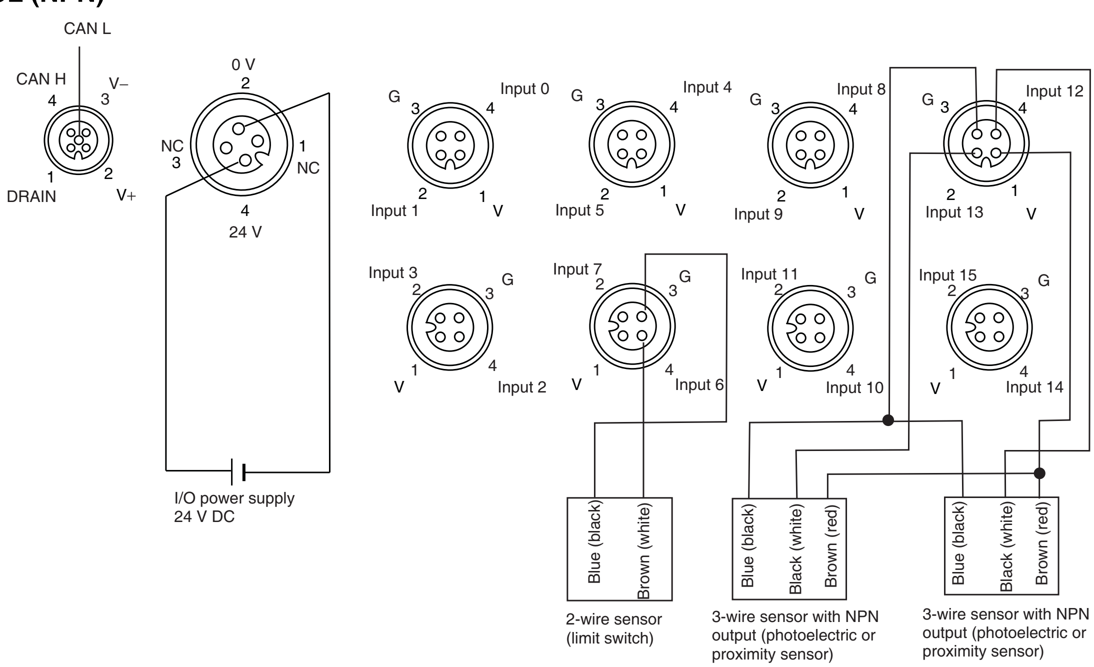



### DRT2-HD16CL-1 (PNP)

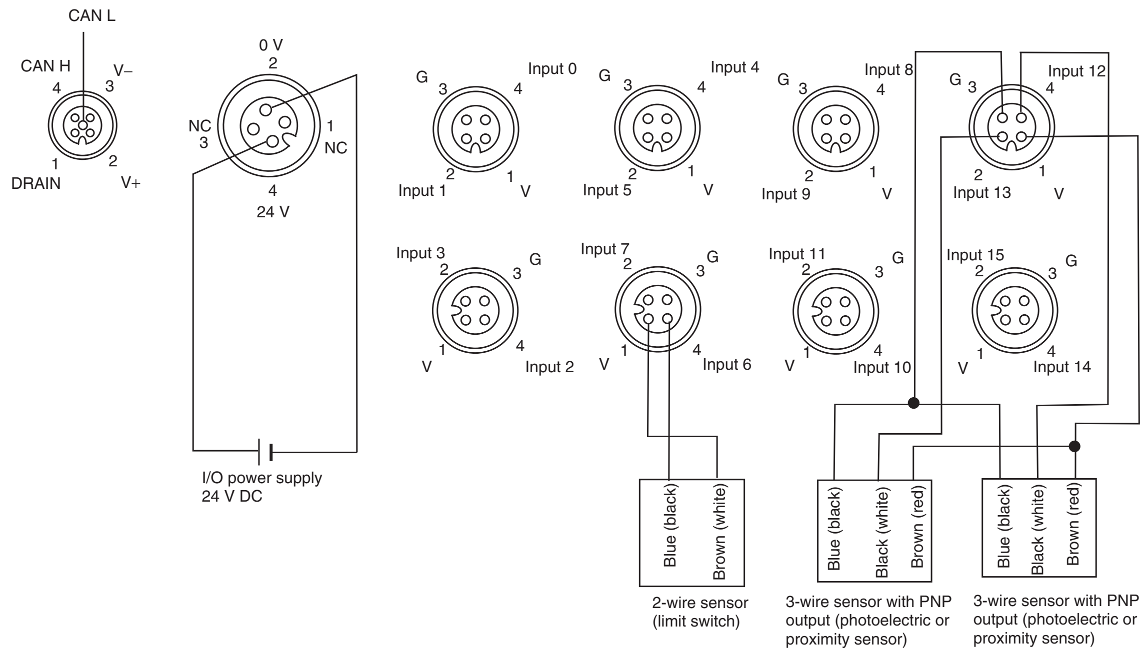



## Wiring

### DRT2-HD16CL (NPN)

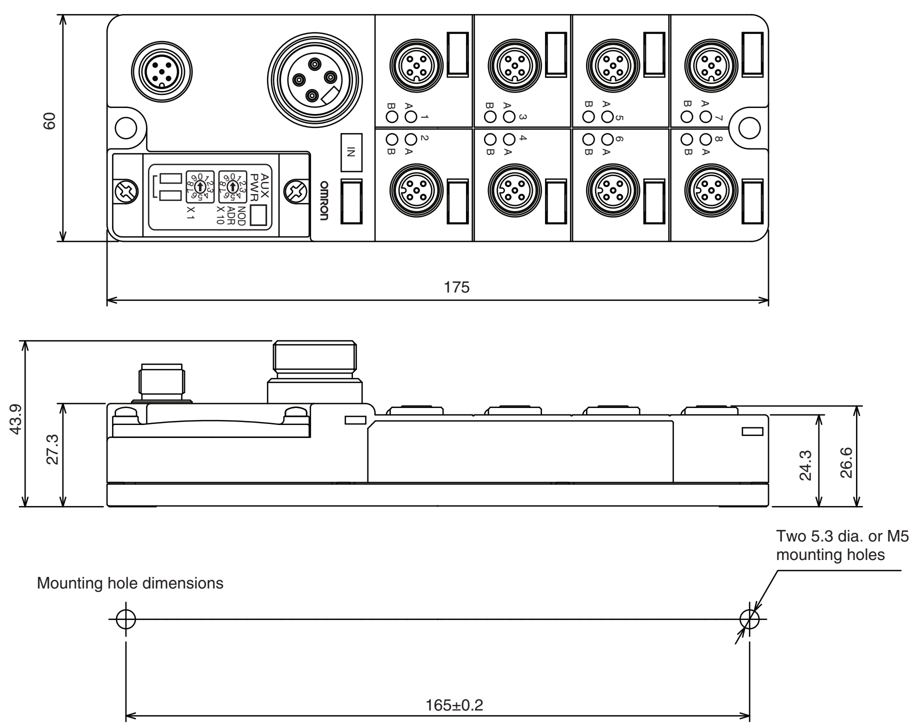


### DRT2-HD16CL-1 (PNP)




**Note** Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-HD16CL and DRT2-HD16CL-1



## 6-5-5 Environment-resistive Terminals with 4 Transistor Outputs (IP67): DRT2-OD04CL (NPN) and DRT2-OD04CL-1 (PNP)

### Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-OD04CL | DRT2-OD04CL-1 |
| Internal I/O common | NPN | PNP |
| Output points | 4 points | |
| Rated output current | 0.5 A/point, 2.0 A/common | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| Residual voltage | 1.2 V max. (0.5 A DC, between each output terminal and G) | 1.2 V max. (0.5 A DC, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 4 points with one common | |

### Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

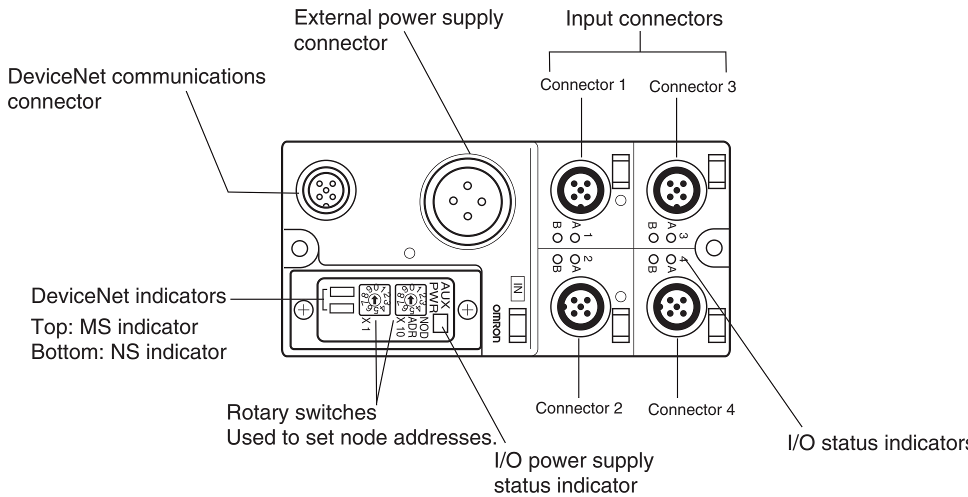
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Output 0 is ON. |
| 2-A | Yellow | ON | Output 1 is ON. |
| 3-A | Yellow | ON | Output 2 is ON. |
| 4-A | Yellow | ON | Output 3 is ON. |

**Note** Although the connectors are numbered from 1 to 4, the input bits are numbered from 0 to 3.

**I/O Power Supply Status Indicator**

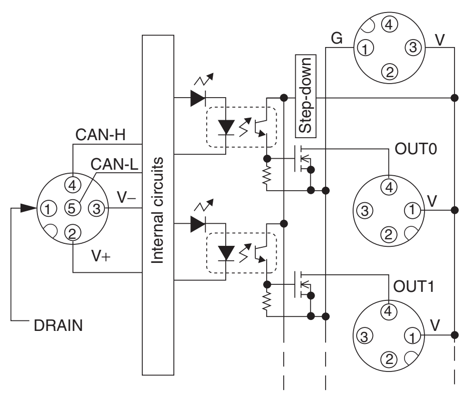
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

### Component Names and Functions: DRT2-OD04CL and DRT2-OD04CL-1

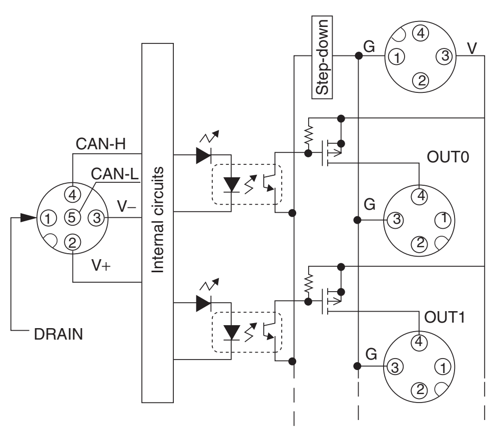



## Internal Circuits

### DRT2-OD04CL (NPN)

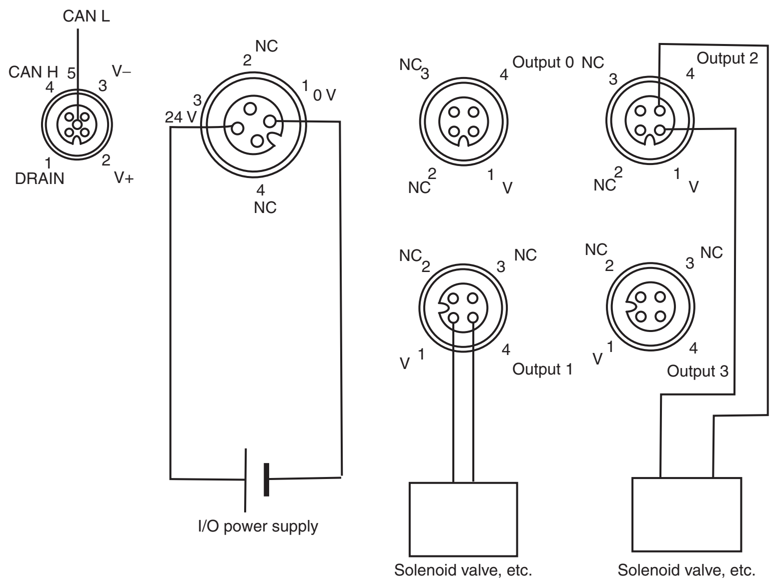



### DRT2-ID04CL-1 (PNP)

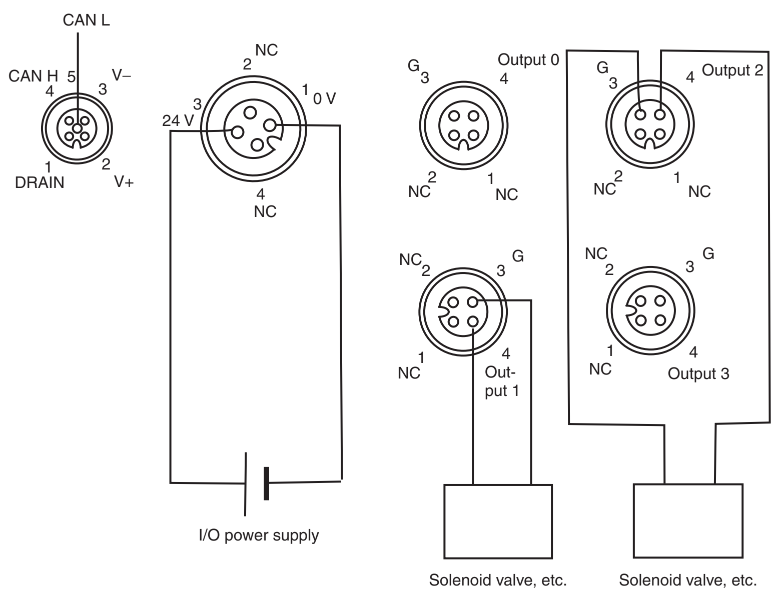


## Wiring

### DRT2-OD04CL (NPN)

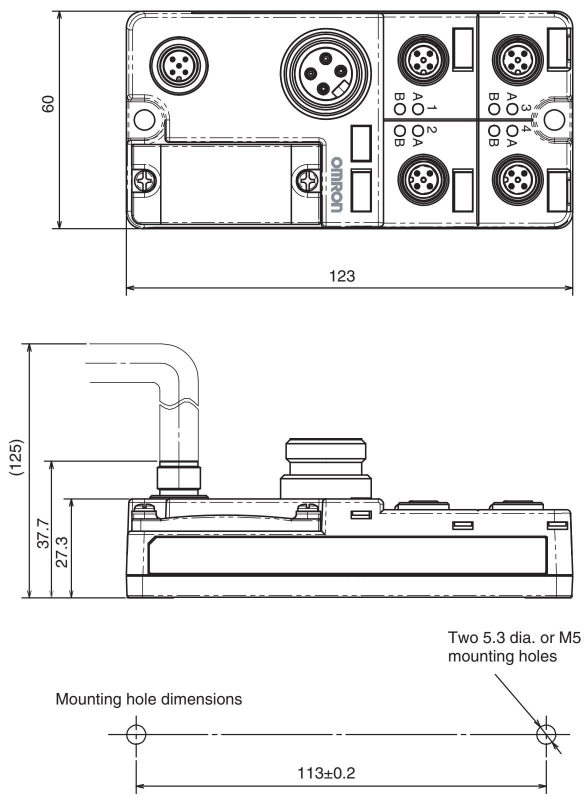



### DRT2-OD04CL-1 (PNP)




**Note** When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: DRT2-OD04CL and DRT2-OD04CL-1




# 6-5-6 Environment-resistive Terminals with 8 Transistor Outputs (IP67): DRT2-OD08CL (NPN) and DRT2-OD08CL-1 (PNP)

## Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-OD08CL | DRT2-OD08CL-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output voltage | 0.5 A/point, 4.0 A/common | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| Residual voltage | 1.2 V max. (0.5 A DC, between each output terminal and G) | 1.2 V max. (0.5 A DC, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

## Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator

name "1-A," the "1" indicates the connector number, and the "A" indicates that it is an I/O status indicator.

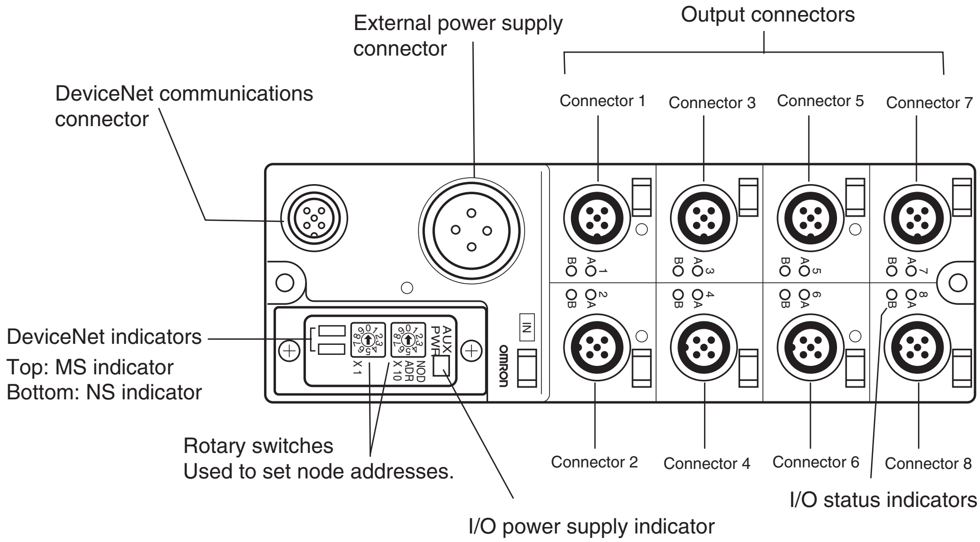
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Output 0 is ON. |
| 2-A | Yellow | ON | Output 1 is ON. |
| 3-A | Yellow | ON | Output 2 is ON. |
| 4-A | Yellow | ON | Output 3 is ON. |
| 5-A | Yellow | ON | Output 4 is ON. |
| 6-A | Yellow | ON | Output 5 is ON. |
| 7-A | Yellow | ON | Output 6 is ON. |
| 8-A | Yellow | ON | Output 7 is ON. |

**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7.

**I/O Power Supply Status Indicator**

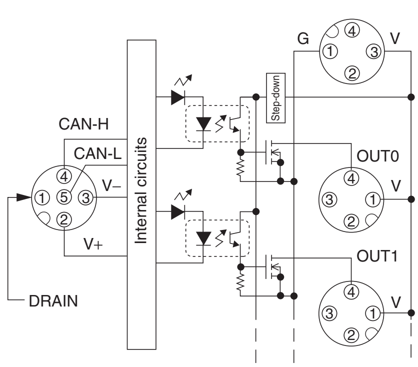
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

### Component Names and Functions: DRT2-OD08CL and DRT2-OD08CL-1

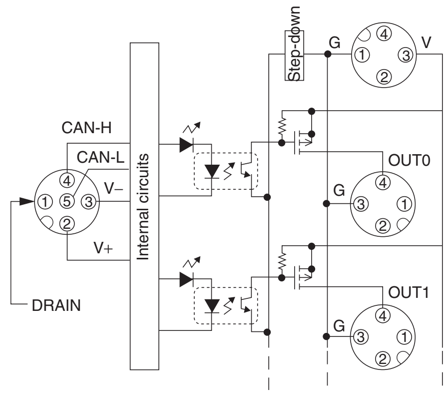



## Internal Circuits

### DRT2-OD08CL (NPN)

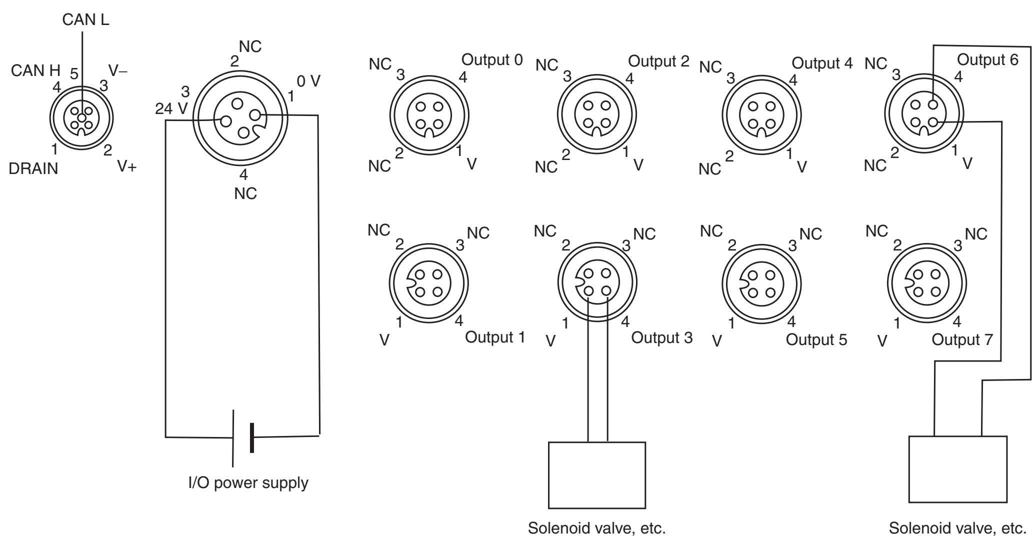


### DRT2-OD08CL-1 (PNP)

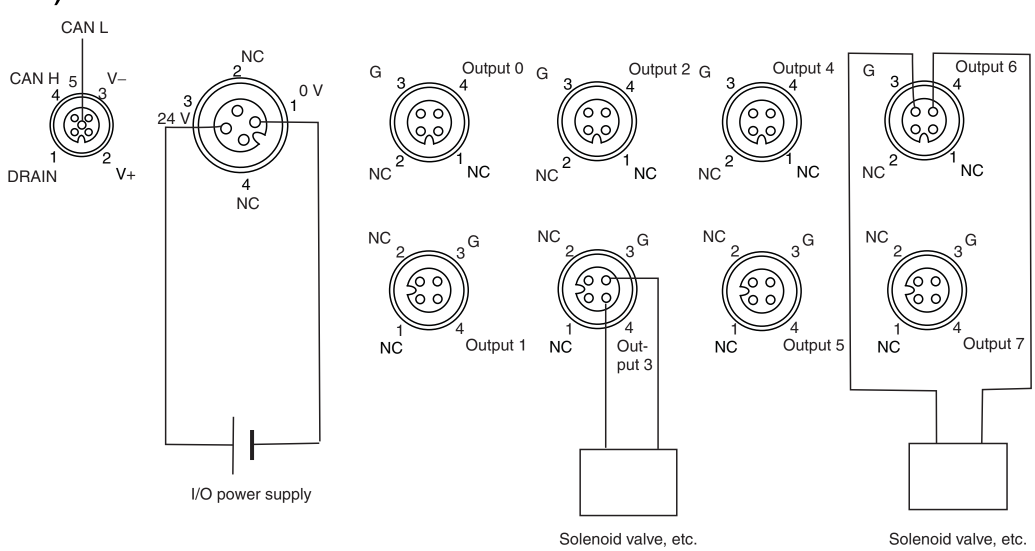



## Wiring

### DRT2-OD08CL (NPN)

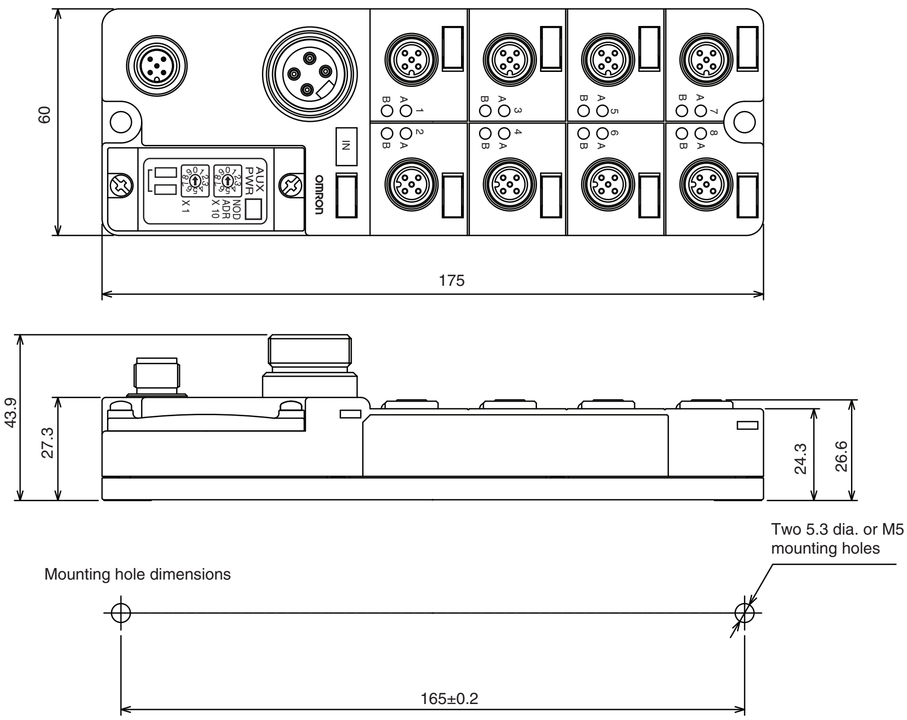



### DRT2-OD08CL-1 (PNP)



**Note** When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: DRT2-OD08CL and DRT2-OD08CL-1




# 6-5-7 Environment-resistive Terminals with 16 Transistor Outputs (IP67): DRT2-WD16CL (NPN) and DRT2-WD16CL-1 (PNP)

## Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-WD16CL | DRT2-WD16CL-1 |
| Internal I/O common | NPN | PNP |
| Output points | 16 points | |
| Rated output current | 0.5 A/point, 2.0 A/common | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, −15 to +10%) | |
| Residual voltage | 1.2 V max. (0.5 A DC, between each output terminal and G) | 1.2 V max. (0.5 A DC, between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 16 points with one common | |

## Indicators

**I/O Status Indicators**

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator

name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

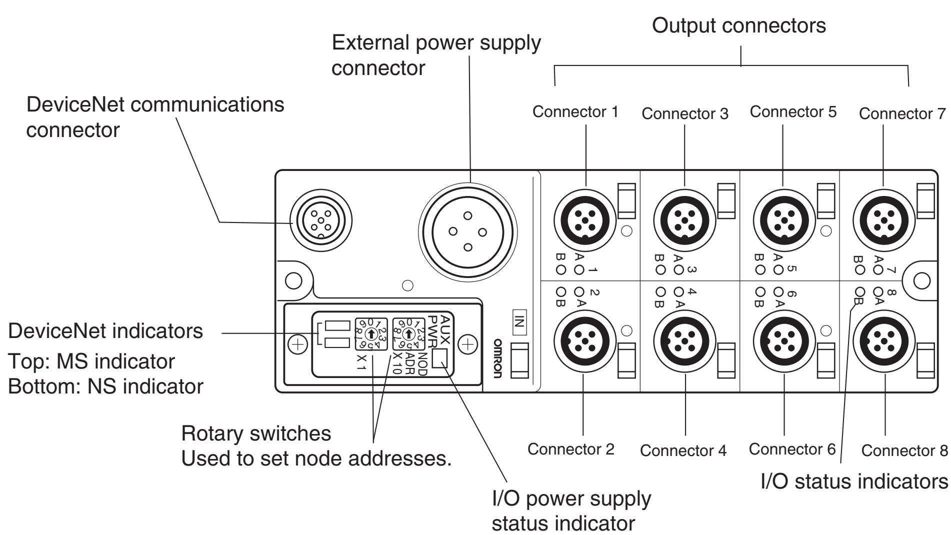
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Output 0 is ON. |
| 1-B | Yellow | ON | Output 1 is ON. |
| 2-A | Yellow | ON | Output 2 is ON. |
| 2-B | Yellow | ON | Output 3 is ON. |
| 3-A | Yellow | ON | Output 4 is ON. |
| 3-B | Yellow | ON | Output 5 is ON. |
| 4-A | Yellow | ON | Output 6 is ON. |
| 4-B | Yellow | ON | Output 7 is ON. |
| 5-A | Yellow | ON | Output 8 is ON. |
| 5-B | Yellow | ON | Output 9 is ON. |
| 6-A | Yellow | ON | Output 10 is ON. |
| 6-B | Yellow | ON | Output 11 is ON. |
| 7-A | Yellow | ON | Output 12 is ON. |
| 7-B | Yellow | ON | Output 13 is ON. |
| 8-A | Yellow | ON | Output 14 is ON. |
| 8-B | Yellow | ON | Output 15 is ON. |

**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7.

**I/O Power Supply Status Indicator**

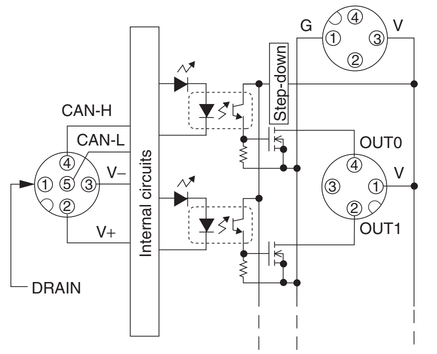
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| AUX PWR | Green | ON | I/O power is being supplied. |

## Component Names and Functions: DRT2-WD16CL and DRT2-WD16CL-1

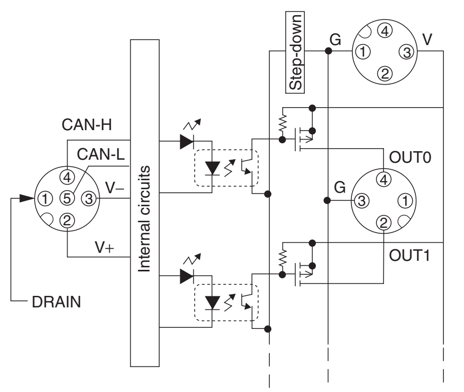


## Internal Circuits

### DRT2-WD16CL (NPN)

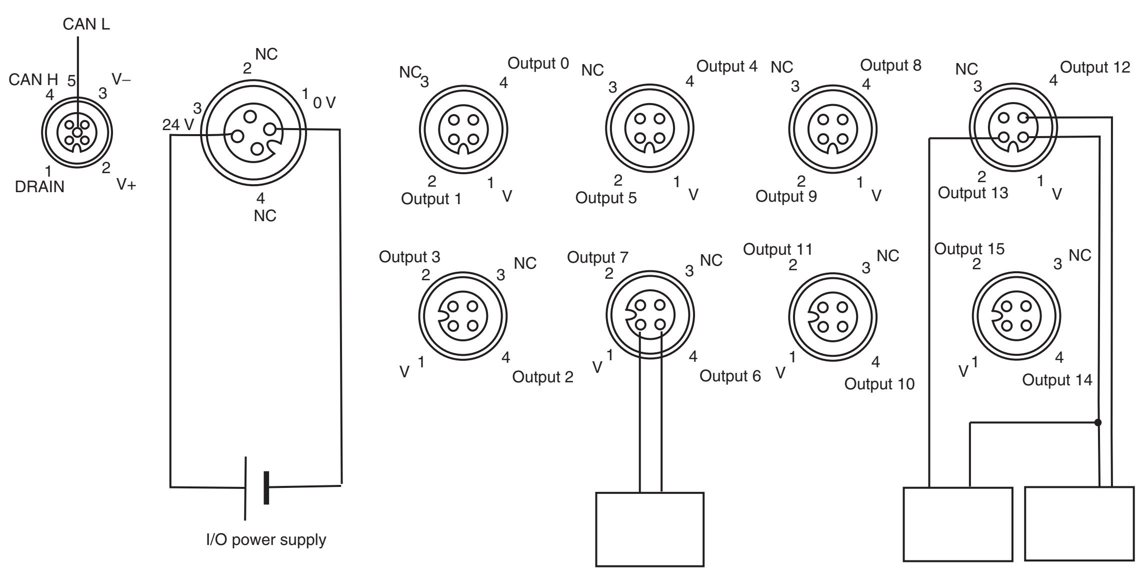



### DRT2-WD16CL-1 (PNP)

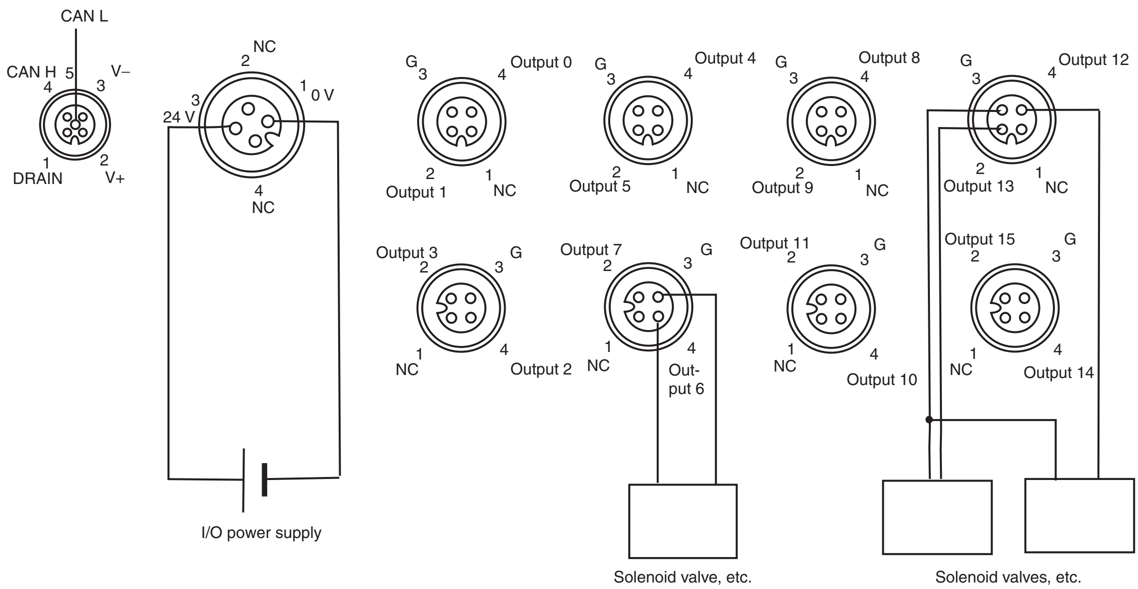



## Wiring

### DRT2-WD16CL (NPN)

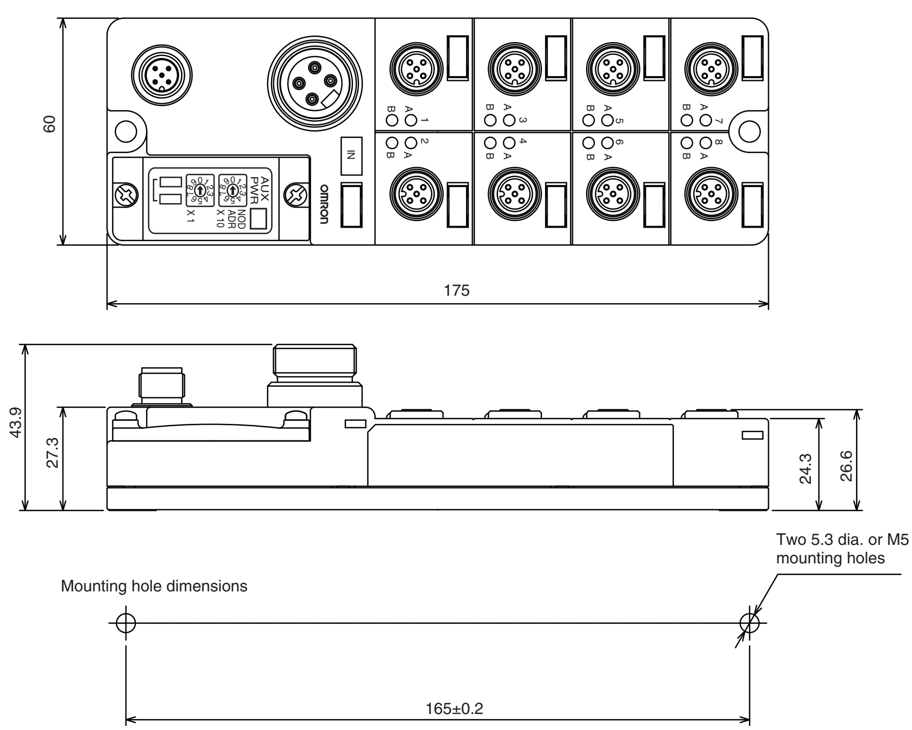


### DRT2-WD16CL-1 (PNP)




**Note** When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)

## Dimensions: DRT2-WD16CL and DRT2-WD16CL-1



## 6-5-8 Environment-resistive Terminals with 8 Transistor Inputs and 8 Transistor Outputs (IP67): DRT2-MD16CL (NPN) and DRT2-MD16CL-1 (PNP)

### Input Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-MD16CL | DRT2-MD16CL-1 |
| Internal I/O common | NPN | PNP |
| Input points | 8 points | |
| ON voltage | 15 V DC min. (between each input terminal and V) | 15 V DC min. (between each input terminal and G) |
| OFF voltage | 5 V DC max. (between each input terminal and V) | 5 V DC max. (between each input terminal and G) |
| OFF current | 1 mA max. | |
| Input current | 6.0 mA max./point (for 24 V DC), 3.0 mA min./point (for 17 V DC) | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| ON delay time | 1.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Output Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-MD16CL | DRT2-MD16CL-1 |
| Internal I/O common | NPN | PNP |
| Output points | 8 points | |
| Rated output voltage | 0.5 A/point, 4.0 A/common | |
| I/O power supply voltage | 20.4 to 26.4 V DC (24 V DC, –15 to +10%) | |
| Residual voltage | 1.2 V max. (0.5 A DC, between each output terminal and G) | 1.2 V max. (0.5 A DC between each output terminal and V) |
| Leakage current | 0.1 mA max. | |
| ON delay time | 0.5 ms max. | |
| OFF delay time | 1.5 ms max. | |
| Number of circuits | 8 points with one common | |

### Indicators

#### I/O Status Indicators

The I/O status indicator displays and their meanings are shown in the following table. Refer to the section following on names of components and functions for details on the location of the I/O status indicators. In the indicator

name “1-A,” the “1” indicates the connector number, and the “A” indicates that it is an I/O status indicator.

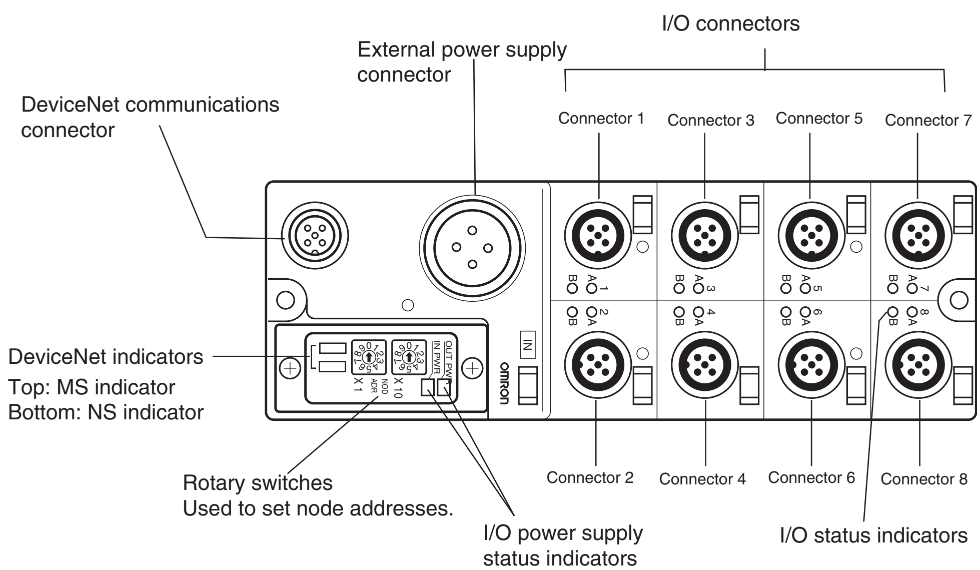
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| 1-A | Yellow | ON | Input 0 is ON. |
| 1-B | Yellow | ON | Input 1 is ON. |
| 2-A | Yellow | ON | Input 2 is ON. |
| 2-B | Yellow | ON | Input 3 is ON. |
| 3-A | Yellow | ON | Input 4 is ON. |
| 3-B | Yellow | ON | Input 5 is ON. |
| 4-A | Yellow | ON | Input 6 is ON. |
| 4-B | Yellow | ON | Input 7 is ON. |
| 5-A | Yellow | ON | Output 0 is ON. |
| 5-B | Yellow | ON | Output 1 is ON. |
| 6-A | Yellow | ON | Output 2 is ON. |
| 6-B | Yellow | ON | Output 3 is ON. |
| 7-A | Yellow | ON | Output 4 is ON. |
| 7-B | Yellow | ON | Output 5 is ON. |
| 8-A | Yellow | ON | Output 6 is ON. |
| 8-B | Yellow | ON | Output 7 is ON. |

**Note** Although the connectors are numbered from 1 to 8, the input bits are numbered from 0 to 7.

### I/O Power Supply Status Indicator

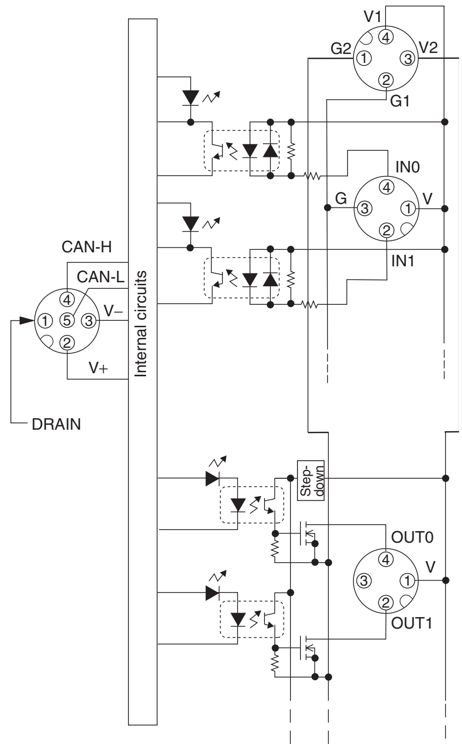
| Indicator | Color | Status | Meaning |
|---|---|---|---|
| IN AUX | Green | ON | IN power is being supplied. |
| OUT AUX | Green | ON | OUT power is being supplied. |

### Component Names and Functions: DRT2-MD16CL and DRT2-MD16CL-1

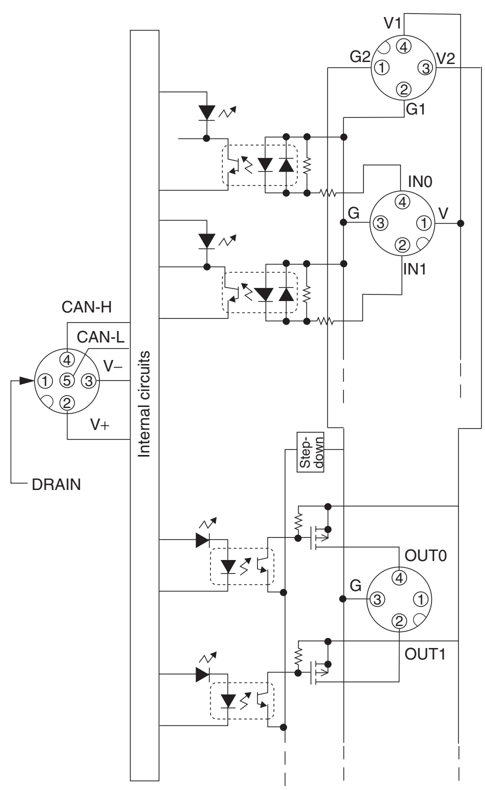


## Internal Circuits

### DRT2-MD16CL (NPN)

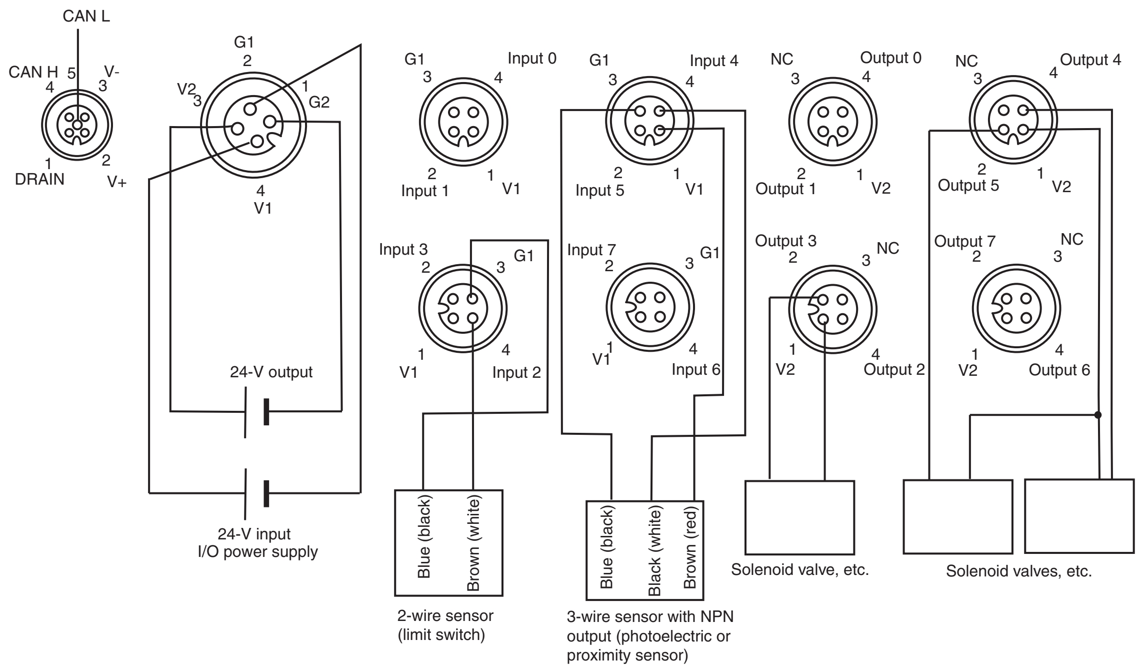



### DRT2-MD164CL-1 (PNP)

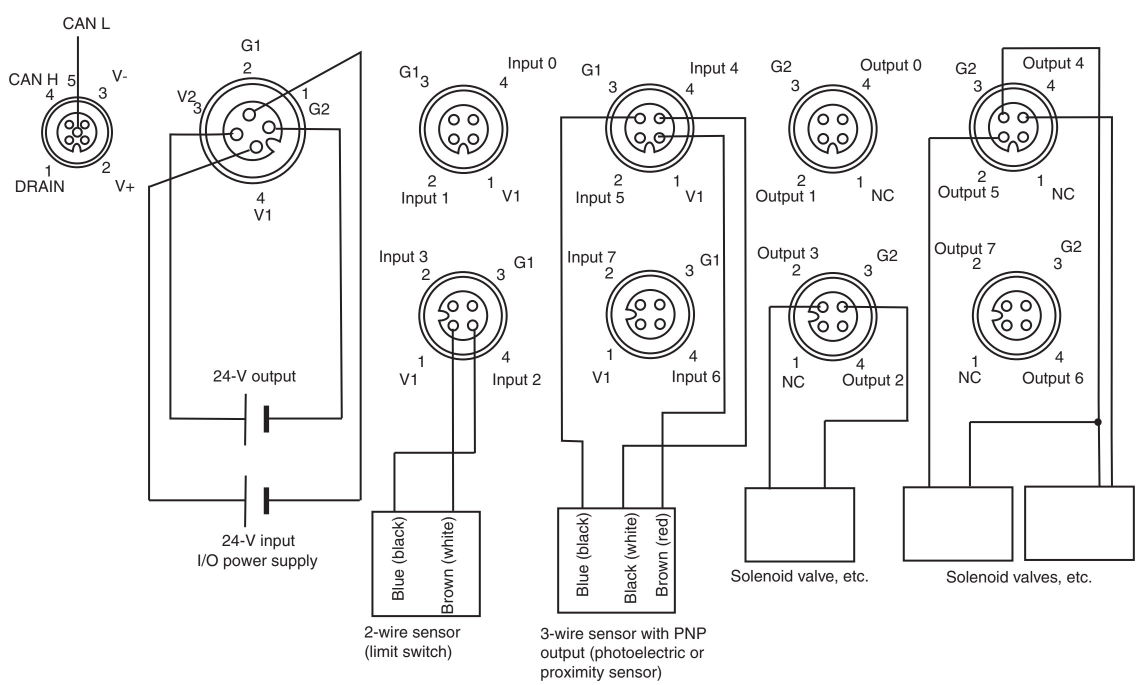


## Wiring

### DRT2-MD16CL (NPN)



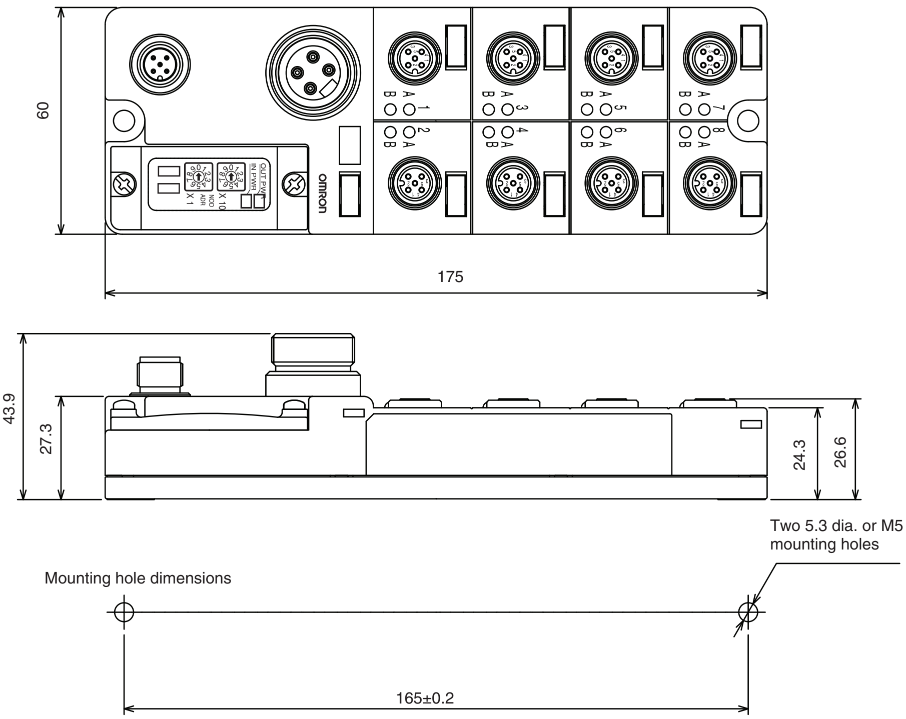

### DRT2-MD16CL-1 (PNP)




**Note**

1. When using an inductive load, such as a solenoid valve, either use a built-in diode to absorb the counterelectromotive force or install an external diode. (Refer to *Appendix G Wiring External Output Signal Lines*.)
2. Wire colors in parentheses are the previous JIS colors for photoelectric and proximity sensors.

## Dimensions: DRT2-MD16CL and DRT2-MD16CL-1




# 6-6 Mounting and Wiring Environment-resistive Slaves

## 6-6-1 Mounting in Control Panels

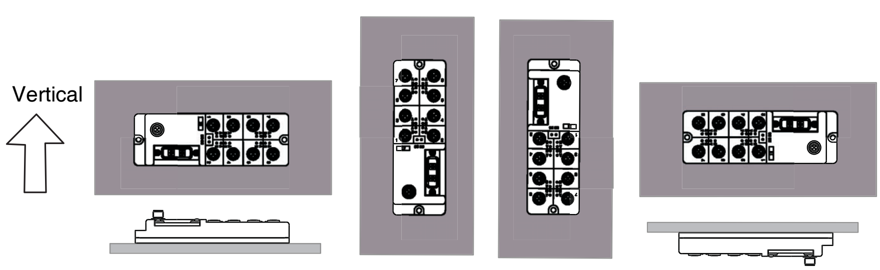
Use screws to mount the Environment-resistive Terminal in the Control Panel. Environment-resistive Terminals cannot be mounted on a DIN Track.

Drill the mounting holes in the control panel according to the dimensions shown in the dimensions diagrams and secure the Terminal with M5 screws.

The appropriate tightening torque is 1.47 to 1.96 N·m.

### Mounting Direction

The terminal can be mounted in any of the following six directions.




## 6-6-2 Wiring the Internal Power Supply, I/O Power Supply, and I/O Lines

### Wiring the Internal Power Supply and I/O Power Supply

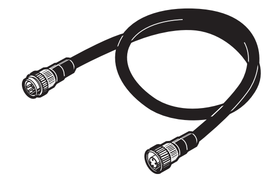
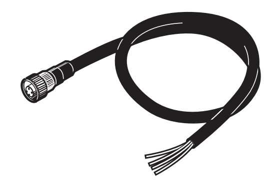
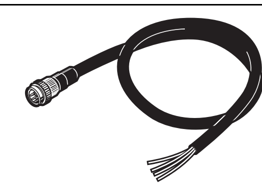
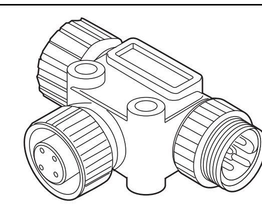
**DRT2-ID08C(-1) and DRT2-HD16C(-1)**

The internal power supply and I/O power supply share the communications power supply so an external power supply is not required.

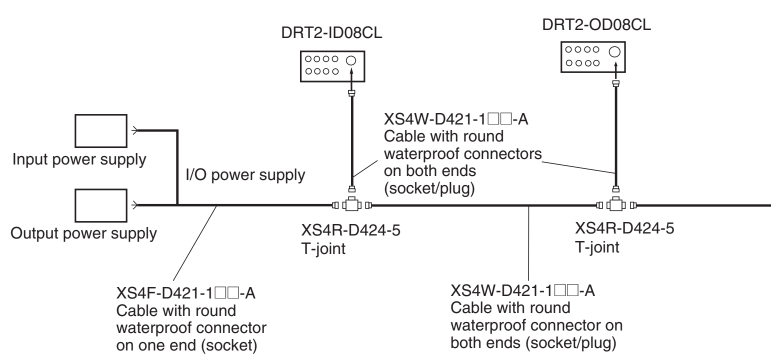
**DRT2-ID04CL(-1), DRT2-OD04CL(-1), DRT2-OD08C(-1), DRT2-ID08CL(-1), DRT2-OD08CL(-1), DRT2-HD16CL(-1), DRT2-WD16CL(-1) and DRT2-MD16CL(-1)**

The internal power supply shares the communications power supply, but the I/O power supply must be supplied from external power supply connectors. The DRT1-series Environment-resistive Terminals used I/O power supply cables with connectors (XS2W-D42□-□8□-□) that are different to the connectors used with the DRT2-series Terminals. Always use the compatible power supply connectors listed in the following table.

**Compatible Connectors**

| Connector | Mode | |
|---|---|---|
| Cable with connectors on both ends (socket and plug) | XS4W-D421-1□□-A |  |
| Cable with connector on one end (female socket) | XS4F-D421-1□□-A |  |
| Cable with connector on one end (male plug) | XS4H-D421-1□□-A |  |
| T-joint | XS4R-D424-5 |  |

**Example System Assembly**




**Note**

1. Tighten the connector by hand to a torque of 0.39 to 0.49 N·m. If the connector is not tightened sufficiently, it will not provide the expected degree of protection and may become loose due to vibration. Do not use pliers or other tools to tighten the connectors, because these tools may damage the connectors.
2. The OMRON S8□□ Power Supply Unit is recommended for the I/O power supply. The load short-circuit detection function uses the transistor's ther-

mal shutdown, so when a Power Supply Unit with a low-capacity rating or instantaneous shutoff overcurrent protection is used, the load short-circuit may not be detected. Always use a Power Supply Unit with a rating of 50 W or higher if it uses dropping overcurrent protection characteristic. Always use a Power Supply Unit with a rating of 150 W or higher if it uses intermittent overcurrent protection. The current limiter will protect the transistor even if short-circuit detection is disabled.

## Wiring I/O

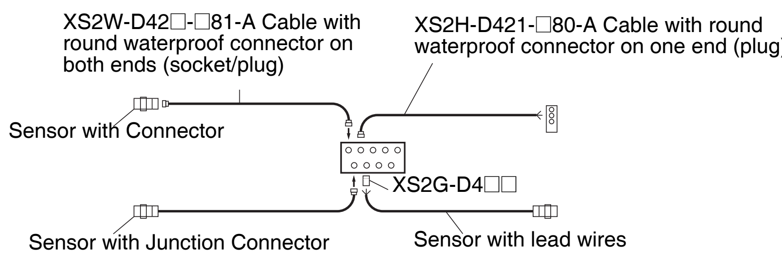
Connect the I/O wiring to the Environment-resistive Terminal with the XS2-series Round Waterproof Connectors listed in the following table.

### Compatible Connectors

| Connector | Model |
|---|---|
| Cable with connector on one end (male plug) | XS2H-D421-□80-A |
| Cable with connectors on both ends (socket and plug) | XS2W-D42□-□81-A |
| Connector plug assembly (male)<br>(Crimp-connector or solder type) | XS2G-D4□□ |

Sensors that are pre-wired with a connector can be connected directly.

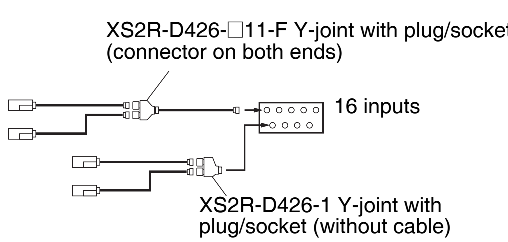
Refer to the catalog or manual for details on the device's pin arrangements before connecting any device.




**Note** Refer to the OMRON Sensors Catalog (X42) for details on Sensor Connections and Round Waterproof Connectors (Sensor I/O Connectors).

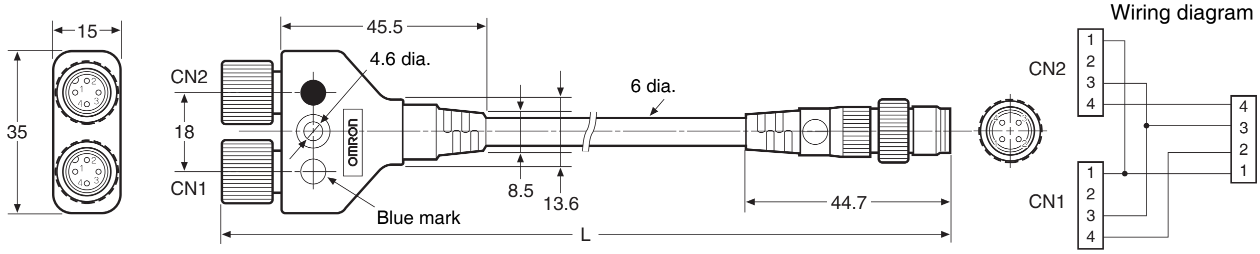
Use one of the following OMRON Y-joints when connecting a DRT2-HD16C(-1), DRT2-HD16CL(-1), DRT2-MD16CL(-1), or DRT2-WD16CL(-1) Environment-resistive Terminal with 16 inputs to sensors or limit switches, except when the sensor has diagnostic output.

| Connector | Model |
|---|---|
| Y-joint with plug/socket (connector on both ends) | XS2R-D426-□11-F |
| Y-joint with plug/socket (without cable) | XS2R-D426-1 |
| Smart-click connector<br>(connector on both ends: with cable) | XS5R-D426- □11-F |
| Smart-click connector<br>(connector on both ends: without cable) | XS5R-D426-1 |



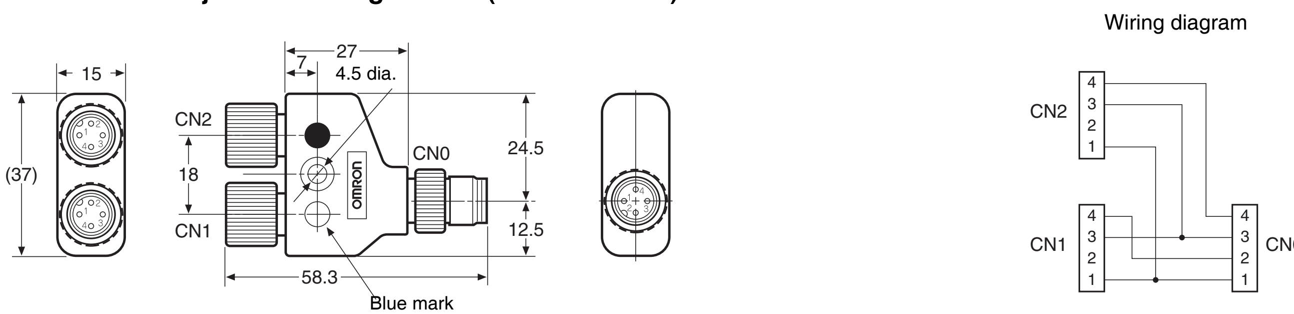
**Note** The XS2G Connector Plug for Custom Cable Assembly (L-shaped type) and XS2W-series L-shaped plug type cannot be connected to a Y-joint Connector, because these connectors will cause interference with any Connectors located beside them.

### XS2R-D426-□11-F Y-joint with Plug/Socket (Connector on Both Ends)




**Note** Refer to the *Sensor I/O Connector Group Catalog* (Cat. No. X073) for details.

### XS2R-D426-1 Y-joint with Plug/Socket (without Cable)




**Note** Tighten the connector by hand to a torque of 0.39 to 0.49 N·m. If the connector is not tightened sufficiently, it will not provide the expected degree of protection and may become loose due to vibration. Do not use pliers or other tools to tighten the connectors, because these tools may damage the connectors.

Always cap unused connectors with an XS2Z-22 Waterproof Cover or XS2Z-15 Dust Cover shown in the following diagram.

| XS2Z-22 Waterproof Cover | XS2Z-15 Dust Cover |
|---|---|
|  |  |
| The connector will meet IP67 standards if a Waterproof Cover is attached. Always tighten the connector by hand to a torque of 0.39 to 0.49 N·m. | Press the Dust Cover onto the connector firmly. The Dust Cover will protect the connector from dust, but does not meet IP67 standards. |

### Maintaining Enclosure Ratings

**Note** 1. The IP67 enclosure rating will not be met if the surfaces where the contact block and cover meet are subjected to excessive force. Protect the contact block and cover from excessive force.

The IP67 standard is lower than waterproof standards. Do not submerge the system components.

The body of the components is plastic resin. Do not place objects on the components or allow the components to be stepped on.

Tighten the switch cover screws to a torque of 0.4 to 0.6 N·m. If the screws are not tightened sufficiently, the protective structure may not be maintained. Also, fit an O-ring to the switch cover to maintain the protective structure.

2. There are two kinds of wiring for OMRON Two-wire Proximity Sensors (pre-wired with connector). One switch has IEC pin arrangement (M1GJ type) and the other has OMRON pin arrangement (M1J type). Refer to the following table to determine the appropriate Environment-resistive Terminal to use with each kind of switch.

| Two-wire Proximity Sensor (pre-wired with connector) | Compatible Terminal |
|---|---|
| IEC pin arrangement (M1GJ type) | DRT2-ID08C-1<br>DRT2-HD16C-1 |
| OMRON pin arrangement (M1J type) | DRT2-ID08C<br>DRT2-HD16C |

# SECTION 7
# Analog Slaves

This section provides the specifications, terminal arrangements, mounting procedures, and connection methods of Analog I/O Terminals. Information is included on types of I/O data that can be allocated, allocation methods and procedures, and math operation processing. Setting methods using the Configurator are also described.

# 7-1 Overview of Analog Slaves

This section provides an overview of Analog Slaves, including details on functions and setting methods for each Slave.

## 7-1-1 DRT2 Analog Slaves

Compared with the previous DRT1 Analog Slaves, DRT2 Analog Slaves combine the maintenance functions (network power voltage monitor and Unit conduction time monitor) of DRT2-series Slaves with various functions of Analog Slaves (such as scaling and peak/bottom hold). Analog Input Terminals are also able to internally perform math on analog input values, which previously required ladder programming in the Master CPU Unit. Analog data or temperature data can be selected from the six values obtained from math operations and allocated in the Master in combination with Generic Status Flags or other status information. (Status information alone can also be allocated.) The Configurator or explicit messages can be used to allocate data in the Master, and to set Analog Slave functions and perform monitoring.

## 7-1-2 Comparison of DRT1 and DRT2 Functions

### Analog Input Terminals

| **Slave** | | **DRT1 Series** | | **DRT2 Series** | |
|---|---|---|---|---|---|
| **Model** | | **DRT1-AD04** | **DRT1-AD04H** | **DRT2-AD04** | **DRT2-AD04H** |
| Analog points | | 4 inputs | | | |
| Input range (signals) | | 0 to 5 V, 1 to 5 V, 0 to 10 V,–10 to 10 V, 0 to 20 mA, 4 to 20 mA | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA (–10 to 10 V not supported) | 0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA (–10 to 10 V not supported) |
| AD conversion cycle | | 2 ms/point (8 ms/4 points or 4 ms/2 points) | 250 ms/ 4 points | By setting the number of conversion points (1 to 4 points), the conversion cycle can be shortened (e.g., 4 points: 4 ms max.)<br>**Note** The conversion cycle will be slightly different when the math operations are used. | 250 ms/ 4 points |
| AD conversion data | | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 1770 hex<br>–10 to 10 V: 8BB8 to 0BB8 hex<br>**Note** Signed binary | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 7530 hex<br>**Note** Two's complement | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 1770 hex<br>–10 to 10 V: F448 to 0BB8 hex<br>**Note** Two's complement | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 7530 hex<br>**Note** Two's complement |
| Resolution | | 1/6,000 (full scale) | 1/30,000 (full scale) | 1/6,000 (full scale) | 1/30,000 (full scale) |
| Unit power supply | | Supplied by local power supply terminal. | | Supplied by communications power supply. | |
| Communications power supply current consumption | | 30 mA max. | | 90 mA max. | 70 mA max. |
| Overall accuracy | 25°C | Voltage input: ±0.3% FS; Current input: ±0.4% FS | | | |
| | –10 to 55°C | 0 to 55°C:<br>Voltage input: ±0.6% FS; Current input: ±0.8% FS | | –10 to 55°C:<br>Voltage input: ±0.6% FS; Current input: ±0.8% FS | |

| Slave | DRT1 Series | | DRT2 Series | |
|---|---|---|---|---|
| **Model** | **DRT1-AD04** | **DRT1-AD04H** | **DRT2-AD04** | **DRT2-AD04H** |
| Data allocated in Master | Only analog input values for 4 inputs | | Default: Analog input values for 4 points<br>The Configurator can be used to allocate peak, bottom, top, and valley values, rate of change, comparator results, Generic Status Flags, etc. | |
| Input switching (Sets number of AD conversion points) | Supported. (Set using DIP switch: Select either 2 or 4 points) | Not supported. | Supported (Set using Configurator: Select from 1 to 4 points) | Not supported. |
| Input range switching | Set using rotary switches: Inputs 0 and 2 share one setting, and Inputs 1 and 3 share another setting. | | • Using DIP switch: Inputs 0 and 1 share setting, Inputs 2 and 3 share setting.<br>• Using Configurator: Inputs 0 to 3 set separately. | |
| Node address setting | Set using DIP switch. | | Set using the rotary switches or the Configurator. | |
| Baud rate setting | Set using DIP switch. | | Automatically detected: Uses baud rate set for Master Unit. | |
| Moving average | Supported. (Set using DIP switch.) | Not supported. | Supported. (Set using Configurator.) | |
| Off-wire detection | Supported. | | | |
| Scaling, offset compensation, peak/bottom hold, top/valley hold, rate of change operations, comparator, user adjustment (maintenance function), cumulative counter (maintenance function), last maintenance date (maintenance function) | Not supported. | | Supported. (Set using Configurator.) | |

## Analog Output Terminals

| Slave | | DRT1 Series | DRT2 Series |
|---|---|---|---|
| **Model** | | **DRT1-DA02** | **DRT2-DA02** |
| Analog points | | 2 outputs | |
| Output signal range | | 1 to 5 V, 0 to 10 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA (0 to 5 V not supported) | 0 to 5 V, 1 to 5 V, 0 to 10 V, –10 to 10 V, 0 to 20 mA, 4 to 20 mA |
| Conversion time | | 4 ms/2 points | 2 ms/2 points |
| AD conversion data | | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 1770 hex<br>–10 to 10 V: 8BB8 to 0BB8 hex<br>**Note** Signed binary | 0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA: 0000 to 1770 hex<br>–10 to 10 V: F448 to 0BB8 hex<br>**Note** Two's complement |
| Resolution | | 1/6,000 (full scale) | |
| Unit power supply | | Supplied by local power supply terminal. | Supplied by communications power supply. |
| Communications power supply current consumption | | 30 mA max. | 120 mA max. |
| Overall accuracy | 25°C | Voltage output: ±0.3% FS; Current output: ±0.4% FS | |
| | –10 to 55°C | 0 to 55°C:<br>Voltage output: ±0.6% FS; Current output: ±0.8% FS | –10 to 55°C:<br>Voltage output: ±0.6% FS; Current output: ±0.8% FS |
| Data allocated in Master | | Only Analog output values for 2 outputs | Default: Analog output values for 2 points<br>The Configurator can be used to allocate Generic Status Flags. |

| Slave | DRT1 Series | DRT2 Series |
|---|---|---|
| **Model** | **DRT1-DA02** | **DRT2-DA02** |
| Input range switching | Set using the rotary switches. | Set using the DIP switch or the Configurator. |
| Node address setting | Set using the DIP switch. | Set using the rotary switches or the Configurator. |
| Baud rate setting | Set using the DIP switch. | Automatically detected: Uses the baud rate set for the Master Unit. |
| Communications error output | Set using the DIP switch. | Set using the Configurator. |
| Scaling, user adjustment (maintenance function), cumulative counter (maintenance function), last maintenance date (maintenance function) | Not supported. | Supported. (Set using the Configurator.) |

## Temperature Input Terminals

| Slave | DRT1 Series | | DRT2 Series | |
|---|---|---|---|---|
| **Model** | **DRT1-TS04T** | **DRT1-TS04P** | **DRT2-TS04T** | **DRT2-TS04P** |
| Input type | Thermocouple | Platinum resistance thermometer | Thermocouple | Platinum resistance thermometer |
| Dimensions | 150 × 40 × 50 (W × H × D) | | 115 × 49.7 × 50 (W × H × D) | |
| Maintenance method | Replacement of each Unit | | Just the Terminal Block can be removed. | |
| Input type setting method | Set with a Rotary Switch. | | Set with a DIP switch (hardware) setting or Configurator (software) setting. | |
| Input type setting | All 4 inputs are set together. | | Inputs can be set individually.<br>(All inputs are set to the same input type if the DIP switch (hardware) setting is used. In addition, the following settings cannot be set individually: Off-wire (disconnection) display setting, Number of display digits setting, and °C/°F setting.) | |
| Input type (sensor type) | R, S, K1, K2, J1, J2, T, B, L1, L2, E, U, N, W, PLII | PT, JPT | R, S, K1, K2, J1, J2, T, B, L1, L2, E, U, N, W, PLII | PT, JPT, PT2, JPT2 |
| Indicator accuracy | ±0.5% of indication value or ±2°C, whichever is larger) ±1 digit max. | ±0.5% of indication value or ±1°C, whichever is larger) ±1 digit max. | ±0.3% of indication value or ±1°C, whichever is larger) ±1 digit max.<br>(See note.) | –200 to 850°C input range:<br>±0.3% of indication value or ±0.8°C, whichever is larger) ±1 digit max.<br>–200 to 200°C input range:<br>±0.3% of indication value or ±0.5°C, whichever is larger) ±1 digit max. |
| Conversion cycle | 250 ms/ 4 points | | | |
| 1/100 display mode | The temperature data is multiplied by 100 and sent to the Master as 6-digit hexadecimal data. In this case, the hexadecimal data is divided into two parts and the parts are sent alternately each 125 ms. (The data is sent in 1-word units). | | The temperature data is multiplied by 100 and sent to the Master as 8-digit hexadecimal data. (The data is sent in 2-word units). | |
| DRT1-compatible 1/100 display mode | --- | | The temperature data is multiplied by 100 and sent to the Master as 6-digit hexadecimal data. In this case, the hexadecimal data is divided into two parts and the parts are sent alternately each 125 ms. (The data is sent in 1-word units). | |

<table>
<tr><th colspan="2">Slave</th><th>DRT1 Series</th><th>DRT2 Series</th></tr>
<tr><td colspan="2">Unit power supply</td><td>Supplied by local power supply terminal.</td><td>Supplied by communications power supply.</td></tr>
<tr><td colspan="2">Communications power supply current consumption</td><td>30 mA max.</td><td>70 mA max.</td></tr>
<tr><td colspan="2">Connections</td><td>Poll, Bitstrobe</td><td>Poll, Bitstrobe, COS/cyclic</td></tr>
<tr><td colspan="2">Data allocated in Master</td><td>Just temperature data for 4 inputs</td><td>Default: Temperature data for 4 inputs<br>The following data items can be allocated by making additional Configurator settings: Peak value, Bottom value, Top value, Valley value, Rate-of-change value, Comparator result; Generic Status Flags, etc.</td></tr>
<tr><td colspan="2">Node address setting</td><td>Set using the DIP switch.</td><td>Set using the rotary switches or the Configurator.</td></tr>
<tr><td colspan="2">Baud rate setting</td><td>Set using the DIP switch.</td><td>Automatically detected: Uses the baud rate set for the Master Unit.</td></tr>
<tr><td colspan="2">Moving average</td><td>Not supported.</td><td>Supported. (Set using Configurator.)</td></tr>
<tr><td colspan="2">Off-wire (disconnection) detection</td><td colspan="2">Supported.</td></tr>
<tr><td colspan="2">Scaling, offset compensation, peak/bottom hold, top/valley hold, rate of change operations, comparator</td><td rowspan="8">Not supported.</td><td rowspan="8">Supported. (Set using Configurator.)</td></tr>
<tr><td rowspan="7">Maintenance functions</td><td>User adjustment</td></tr>
<tr><td>Cumulative counter</td></tr>
<tr><td>Last maintenance date</td></tr>
<tr><td>Input temperature variation detection function</td></tr>
<tr><td>Temperature integration function</td></tr>
<tr><td>Top/Valley count function</td></tr>
<tr><td>Temperature range timing function</td></tr>
</table>

**Note** The Indicator accuracy depends on the mounting method. For details, refer to the *Performance Specifications* in *7-6-1 DRT2-TS04T and DRT2-TS04P Temperature Input Terminals*.

## 7-1-3 List of Data Processing Functions

The following tables list the data processing functions that can be used with Analog Slaves. Refer to *7-4-3 Functions and Settings* for details on functions and setting methods.

### DRT2-AD04/DRT2-AD04H Analog Input Terminals

| Function | Details | Default |
|---|---|---|
| Moving average | Calculates the average of the past eight analog input values, and produces a stable input value even when the input value is unsteady. | Moving average disabled. |
| Setting the number of AD conversion points (DRT2-AD04 only) | By reducing the number of input conversion points, the conversion cycle speed can be increased. For details, refer to *7-4-4 Calculating the Conversion Cycle (DRT2-AD04 Only).* | 4-point conversion |

| Function | Details | Default |
|---|---|---|
| Scaling | Performs scaling.<br>Scaling allows conversion of values between 0 and 6,000 (0 to 30,000 in the DRT2-AD04H) into values using the industry unit required by the user. It reduces the number of operations requiring ladder programming in the Master CPU Unit. Scaling also supports an offset function for compensating for mounting errors in sensors and other devices. | 0 to 6,000 (DRT2-AD04)<br>0 to 28,000 (DRT2-AD04H) |
| Peak/bottom hold | Holds the maximum and minimum analog input values. | Disabled |
| Top/valley hold | Holds the top and valley values for analog input values. | Disabled |
| Rate of change | Calculates the rate of change for analog input values. | Disabled |
| Comparator | Compares the analog input value or an analog value after math processing (value for peak, bottom, top, valley, rate of change) with the four set values HH, H, L, and LL, and indicates the result with the Analog Status Flags. | Disabled |
| Off-wire detection | Detects disconnections of analog inputs. (Valid only for the input ranges 4 to 20 mA and 1 to 5 V) | Enabled |
| User adjustment | Adjusts the input when an offset occurs in the input voltage or current. | Disabled |
| Cumulative counter | Calculates an approximation to the integral of analog input values over time. | Disabled |
| Last maintenance date | Records the date of the last maintenance in the Unit. | 2002/1/1 (DRT2-AD04)<br>2004/1/1 (DRT2-AD04H) |

## DRT2-DA02 Analog Output Terminals

| Function | Details | Default |
|---|---|---|
| Scaling | Performs scaling.<br>Scaling allows conversion of values between 0 and 6,000 into values using the industry unit required by the user. It reduces the number of operations required in ladder programming in the Master. | Disabled (0 to 6,000) |
| User adjustment | Adjusts the output when an offset occurs in the output voltage or current. | Disabled |
| Cumulative counter (maintenance function) | Calculates an approximation to the integral of analog output values over time. | Disabled |
| Error output value setting | Sets the value output when a communications error occurs for each output. | Low limit |
| Last maintenance date | Records the date of the last maintenance in the Unit. | 2002/1/1 |

## DRT2-TS04T/DRT2-TS04P Temperature Input Terminals

| Function | Details | Default |
|---|---|---|
| Moving average | Calculates the average of the past eight temperature input values, and produces a stable input value even when the input value is unsteady. | Moving average disabled. |
| Scaling | Performs scaling.<br>Scaling allows input values to be converted using default upper and lower limits that can be set independently in each Unit. The scaling function reduces the number of operations requiring ladder programming in the Master CPU Unit. Scaling also provides an offset function to compensate for mounting errors in sensors and other devices. | Disabled<br>0 to 28, 000 |
| Peak/bottom hold | Holds the maximum and minimum temperature input values. | Disabled |
| Top/valley hold | Holds the top and valley temperature input values. | Disabled |
| Rate of change | Calculates the rate of change of temperature input values. | Disabled |

| Function | | Details | Default |
|---|---|---|---|
| Comparator | | Compares the temperature input value or an analog value after math processing (value for peak, bottom, top, valley, rate of change) with the four set values HH, H, L, and LL, and indicates the result with the Analog Status Flags. | Disabled |
| Off-wire detection | | Detects disconnections of analog inputs. | Enabled |
| User adjustment | | An offset caused by hardware inaccuracy (or other factor) can be corrected with an arbitrary user-set input value. | Disabled |
| Last maintenance date | | Records the date of the last maintenance in the Unit. | 2004/1/1 |
| Input temperature variation detection function | | Makes a relative comparison of two inputs and detects a temperature difference between two inputs. | Disabled |
| Replacement monitoring functions | Temperature integration function | Compiles the total heat exposure of a device or sensor by multiplying the temperature and measurement time. | Disabled |
| | Top/Valley count function | Counts the number of heating cycles handled by a device or application that has fixed cycles of temperature changes. | Disabled |
| | Temperature range timing function | Measures how long the system is at a user-set temperature or within a user-set temperature range. | Disabled |

## 7-1-4 Data Processing Flowcharts (Analog/Temperature Input Terminals)

**Analog Input Value or Temperature Input Value**

The following math operations can be performed on the external analog input value or temperature input value. The values obtained after processing (analog input values or temperature input values) can be allocated as I/O in the Master.

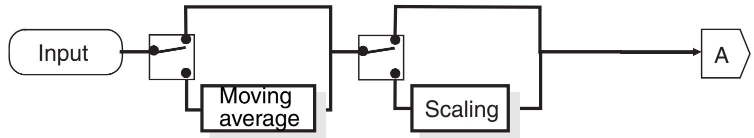
- Scaling to desired industry unit
- Moving average processing (not supported by the DRT2-AD04H)

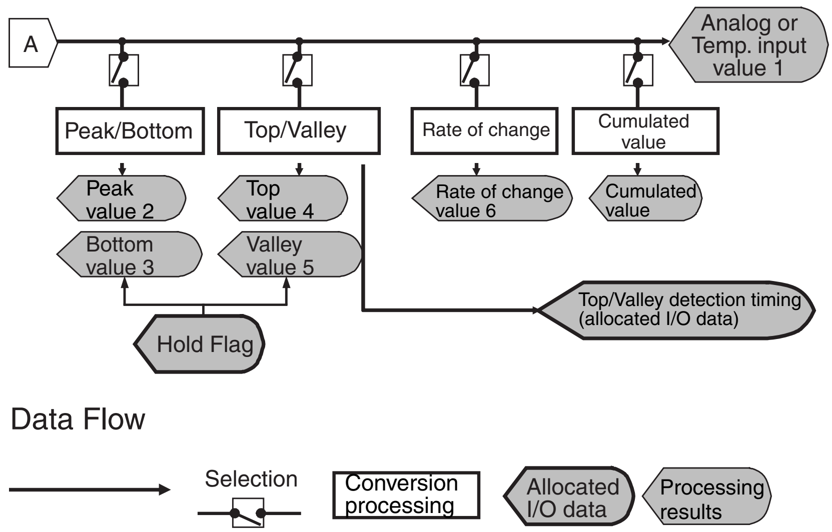
**Other Operation Results**

After moving average and scaling processing, the analog input value or temperature input value can be processed using the following operations. The values after processing are called peak value, bottom value, top value, valley value, rate of change, and cumulated value.

- Peak/hold operation
- Top/valley operation
- Rate of change operation
- Cumulative operation (maintenance function)

Analog processing is performed according to the following flowchart.

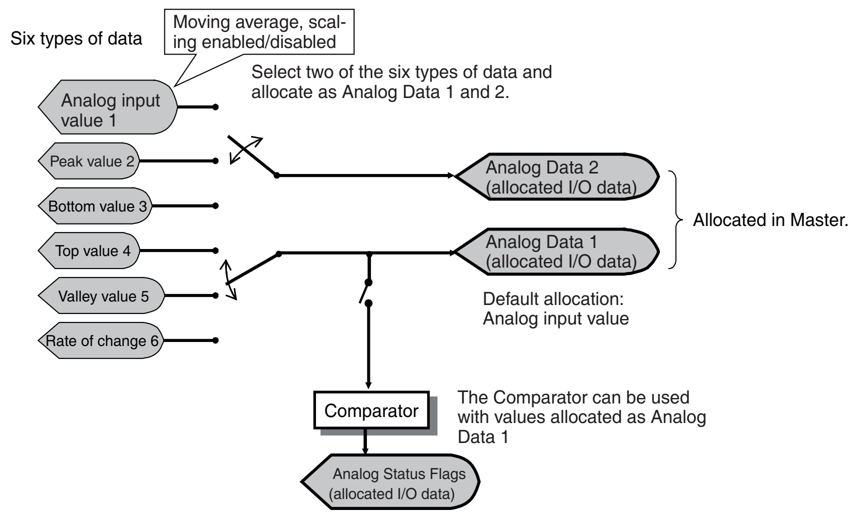


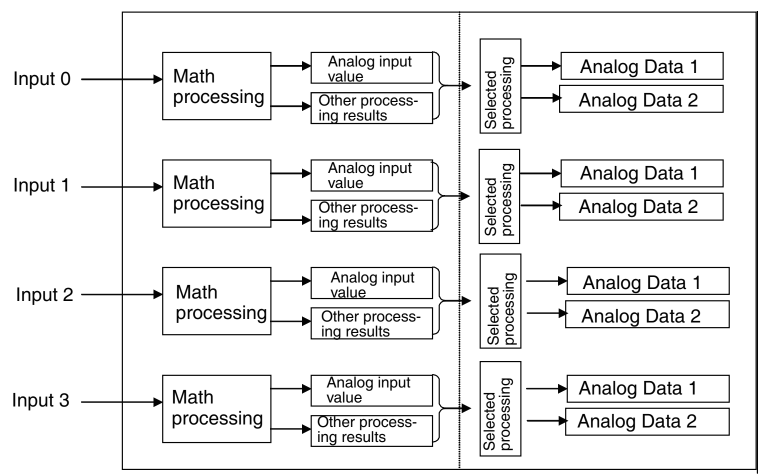

## 7-1-5 Selecting Data (Analog/Temperature Input Terminals)

After performing math operations, select up to two of the six resulting values to allocate in the Master, from the analog/temperature input value, peak value, bottom value, top value, valley value, and rate of change. The selected data is referred to as “analog data” or “temperature data,” and can be allocated in the Master individually or in combination with Status Flags. The data is selected using the Configurator or explicit messages. For Analog Data 1 or Temperature Data 1, comparison operations with four alarm set values can be performed (comparator function).

### Flow of Data in Analog Input Terminals

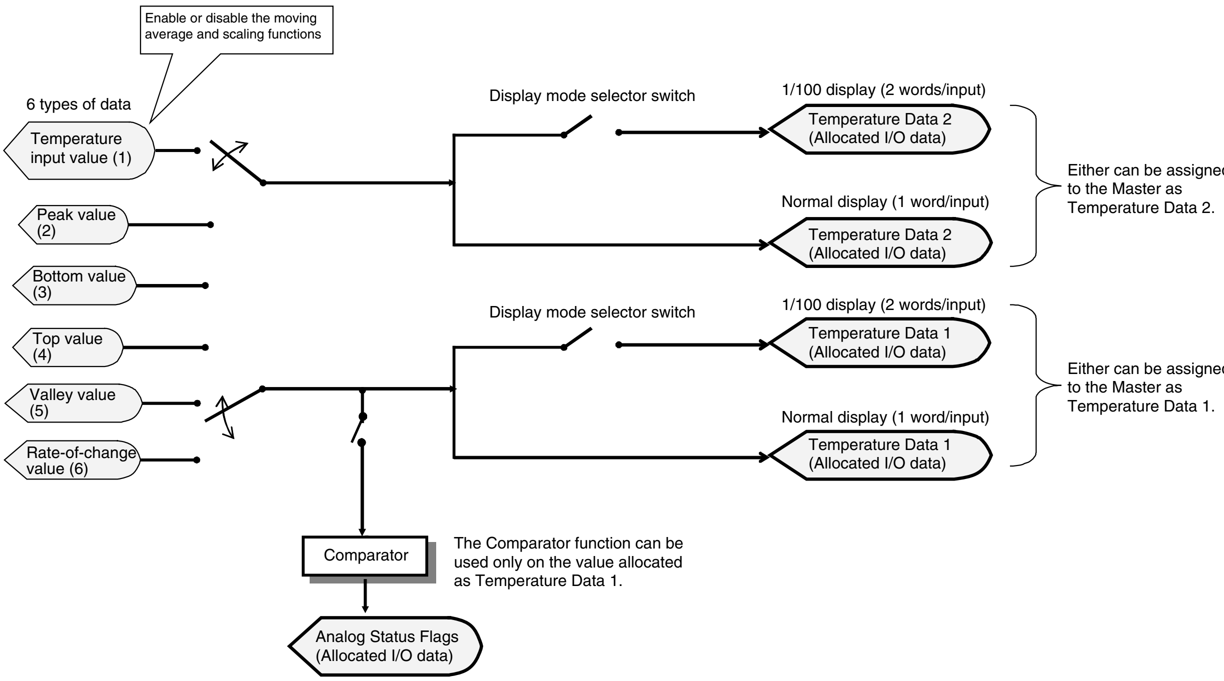



For Inputs 0 to 3, Analog Data 1 and 2 can be separately selected, as shown in the following diagram.



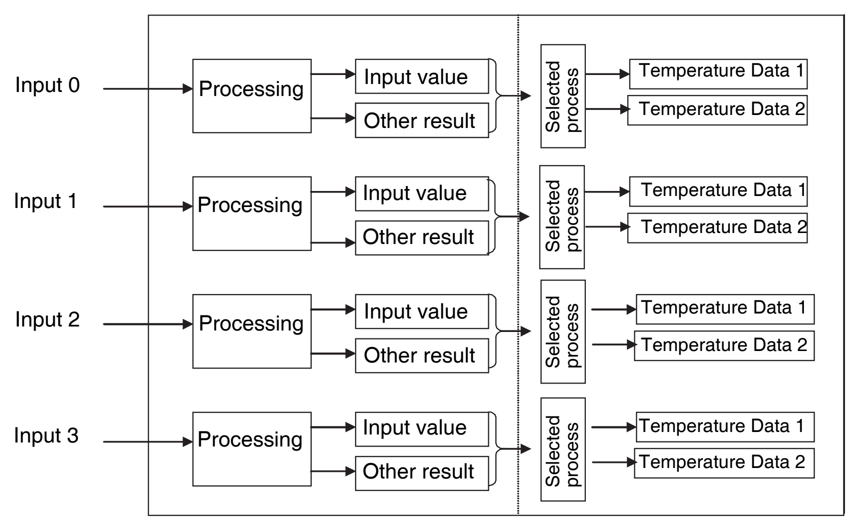

### Flow of Data in Temperature Input Terminals

In a Temperature Input Terminal, it is possible to select from six types of data and switch the display mode. The display mode can be "normal display mode" or “1/100 display mode” and the data can be allocated as “Temperature Data 1” or “Temperature Data 2.”




**Note** The Temperature Data 1 and Temperature Data 2 settings must be set to “normal display” when using the DRT1-compatible 1/100 display mode. Refer to *7-6-2 Temperature Input Terminal Display Modes* for details on the DRT1-compatible 1/100 display mode.

Temperature Data 1 and Temperature Data can be selected separately with inputs 0 to 3, as shown in the following diagram.



## 7-1-6 I/O Data Allocated in the Master

### Analog and Temperature Input Terminals

Analog Input Terminals and Temperature Input Terminals support the following five types of input data (three of which are Status Flags), and one type of output data. The required data can be allocated in the Master either individually or in combination with other data.

#### Individual Input Data

| I/O data | Details | Assembly Instance No. |
|---|---|---|
| Analog Data 1<br>(8 input bytes)<br>Temperature Data 1<br>(Normal display: 8 input bytes<br>1/100 display: 16 input bytes) | • Used to monitor analog data or temperature data.<br>• Select one type of data from analog/temperature input value, peak value, bottom value, top value, valley value, or rate of change. (Default allocation: Analog or Temperature input value)<br>**Note** The comparator can be used with Analog Data 1 or Temperature Data 1. | 104<br>108 (for 1/100 display of Temperature Data, see note) |
| Analog Data 2<br>(8 input bytes)<br>Temperature Data 2<br>(Normal display: 8 input bytes<br>1/100 display: 16 input bytes) | • Used to monitor other data at the same time as the data allocated to Analog Data 1 or Temperature Data 1.<br>• Select one type of data from analog/temperature input value, peak value, bottom value, top value, valley value, or rate of change.<br>**Note** The temperature difference detection function can be used to detect differences between the value in an input word and Temperature Data 2. | 114<br>118 (for 1/100 display of Temperature Data, see note) |
| Generic Status Flags (1 input byte) | Used to allocate the Network Voltage Monitor Flag, the Unit Conduction Time Monitor Flag, and the Cumulative Counter Flag. | 121 |
| Top/Valley Detection Timing Flags (2 input bytes) | Top/Valley Detection Timing Flags are allocated in one word. These flags are used to time reading the values held as the top and valley values when both the top and valley values are allocated at the same time. | 122 |
| Analog Status Flags (4 input bytes) | Used to allocate the bits for the Comparator Result Flag, Top/Valley Detection Timing Flag and Off-wire Detection Flag. The function of each bit is as follows:<br>• Comparator Result Flags<br>Allow control of the judgement results only, without allocating analog values<br>• Top/Valley Detection Timing Flags<br>Used to time reading the values held as the top and valley values when both the top and value values are allocated at the same time.<br>• Off-wire Detection Flags<br>Disconnections can be detected even when the analog values are not allocated. | 134 |

**Note** Always set the connection path with the Configurator when the display mode is set to 1/100 display mode on the Unit's DIP switch. If the "normal display" I/O data is selected with the configurator, the temperature data allocated in the I/O data will be 0.

#### Individual Output Data

| I/O data | Details | Assembly Instance No. |
|---|---|---|
| Hold Flags (1 output byte) | Used with each of the hold functions (peak, bottom, top, and valley) to control the execution timing of hold functions from the Master. | 190 |

### Fixed I/O Data Combinations (DRT2-AD04 and DRT2-AD04H)

| I/O Data Type | Details | Assembly Instance No. |
|---|---|---|
| Analog Data 1 + Analog Data 2 (16 input bytes) | Allocation of Analog Data 1 followed by Analog Data 2. | 144 |
| Top/Valley Detection Timing Flags + Generic Status Flags (3 input bytes) | Allocation of the Top/Valley Detection Timing Flags followed by the Generic Status Flags. | 151 |
| Analog Status Flags + Generic Status Flags (5 input bytes) | Allocation of the Analog Status Flags followed by the Generic Status Flags. | 164 |
| Analog Data 1 + Top/Valley Detection Timing Flags (10 input bytes) | Allocation of Analog Data 1 followed by the Top/Valley Detection Timing Flags. | 174 |
| Analog Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags (11 input bytes) | Allocation of Analog Data 1 followed by Top/Valley Detection Timing Flags and then the Generic Status Flags. | 184 |

### Fixed I/O Data Combinations (DRT2-TS04T and DRT2-TS04P)

| I/O Data Type | Details | Assembly Instance No. |
|---|---|---|
| Temperature Data 1 + Temperature Data 2<br>16 input bytes (Normal display)<br>32 input bytes (1/100 display) | Allocation of Temperature Data 1 followed by Temperature Data 2. | 144 (Normal display)<br>148 (1/100 display) |
| Top/Valley Detection Timing Flags + Generic Status Flags (3 input bytes) | Allocation of the Top/Valley Detection Timing Flags followed by the Generic Status Flags. | 151 |
| Analog Status Flags + Generic Status Flags (5 input bytes) | Allocation of the Analog Status Flags followed by the Generic Status Flags. | 164 |
| Temperature Data 1 + Top/Valley Detection Timing Flags<br>10 input bytes (Normal display)<br>18 input bytes (1/100 display) | Allocation of Temperature Data 1 followed by the Top/Valley Detection Timing Flags. | 174 (Normal display)<br>178 (1/100 display) |
| Analog Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags<br>11 input bytes (Normal display)<br>19 input bytes (1/100 display) | Allocation of Temperature Data 1 followed by Top/Valley Detection Timing Flags and then the Generic Status Flags. | 184 (Normal display)<br>188 (1/100 display) |

**Note** Data can be allocated using other data combinations, but only when an OMRON CS/CJ-series Master Unit is used because the settings are made in the Master Unit.

## Analog Output Terminals

Analog Output Terminals support one type of input data and output data each. Allocate the required data as shown in the following tables.

### Input Data

| Data Type | Details | Assembly Instance No. |
|---|---|---|
| Generic Status Flags (1 input byte) | Used to allocate the Network Voltage Monitor Flag, the Unit Conduction Time Monitor Flag, and the Cumulative Counter Flag. | 121 |

### Output Data

| Data Type | Details | Assembly Instance No. |
|---|---|---|
| Output data (4 output bytes) | Used to allocate analog output data. | 192 |

## 7-1-7 Allocating I/O Data in the Master

I/O is allocated in the Master using the methods shown in the following table. Select the appropriate method depending on whether the allocated area in the Master is fixed or user-defined, and whether the allocated I/O data is the default I/O, a selected combination of data, or user-defined data.

<table>
<tr><th colspan="2">Allocation method</th><th rowspan="2">I/O data that can be allocated in the Master</th></tr>
<tr><th>Allocated area in Master</th><th>Allocated I/O data</th></tr>
<tr><td rowspan="2">Fixed allocations</td><td>1. Default I/O data allocation</td><td>Allocates only analog/temperature input values for 4 points.</td></tr>
<tr><td>2. Using Configurator to select I/O data (patterns) by editing the Slave's device parameters (fixed I/O data combinations)<br>Note Settings from the Master are supported by CJ/CS-series DeviceNet Units only.</td><td>The following 11 types of I/O data can be allocated by selecting from the pull-down menu for the Slave's default connection path.<br>• Analog Data 1 or Temperature Data 1<br>• Analog Data 2 or Temperature Data 2<br>• Generic Status Flags<br>• Top/Valley Detection Timing Flags<br>• Analog Status Flags<br>• Analog Data 1 + Analog Data 2 or Temperature Data 1 + Temperature Data 2<br>• Top/Valley Detection Timing Flags + Generic Status Flags<br>• Analog Status Flags + Generic Status Flags (5 input bytes)<br>• Analog Data 1 or Temperature Data 1 + Top/Valley Detection Timing Flags<br>• Analog Data 1 or Temperature Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags<br>• Hold Flags</td></tr>
<tr><td rowspan="3">User allocations</td><td>1. Default I/O data allocation</td><td>(Same as fixed allocations.)</td></tr>
<tr><td>2. Using Configurator to select I/O data (patterns) by editing the Slave's device parameters (fixed I/O data combinations)</td><td>(Same as fixed allocations.)</td></tr>
<tr><td>3. Using Configurator to select I/O data for each connection by editing the Master's device parameters and allocating each data to user-defined addresses (user-defined I/O data combinations)<br>Note Supported by CJ/CS-series DeviceNet Units only.</td><td>The following 11 types of I/O data can be allocated by selecting up to two types from the pull-down menu for the Master's connection path.<br>• Analog Data 1 or Temperature Data 1<br>• Analog Data 2 or Temperature Data 2<br>• Generic Status Flags<br>• Top/Valley Detection Timing Flags<br>• Analog Status Flags<br>• Analog Data 1 + Analog Data 2<br>• Top/Valley Detection Timing Flags + Generic Status Flags<br>• Analog Status Flags + Generic Status Flags<br>• Analog Data 1 or Temperature Data 1 + Top/Valley Detection Timing Flags<br>• Analog Data 1 or Temperature Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags<br>• Hold Flags</td></tr>
</table>

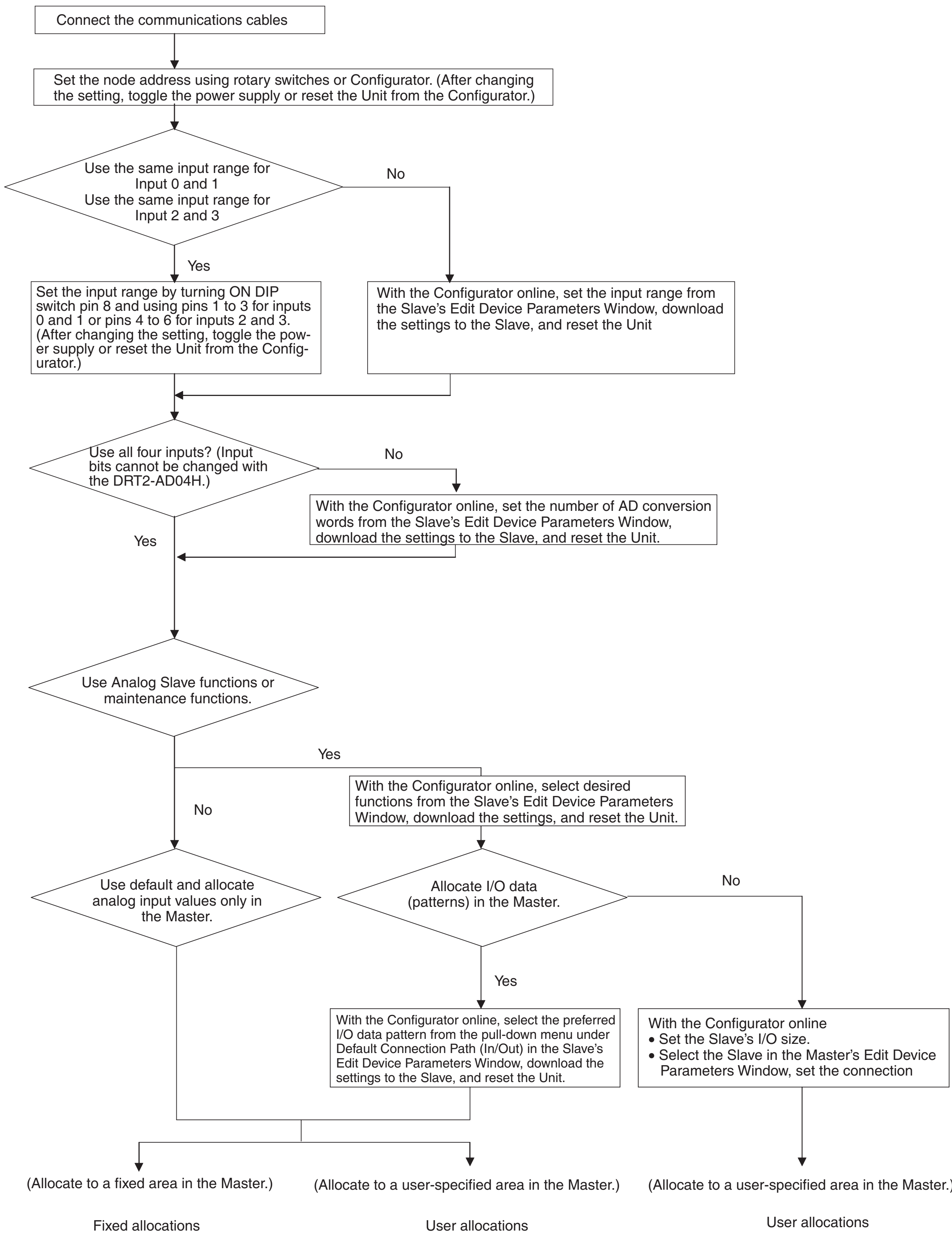
**Note** For details on the data allocation patterns and methods, refer to *7-4-2 I/O Data Allocation Methods.*

## 7-1-8 Procedure for Allocating I/O in the Master

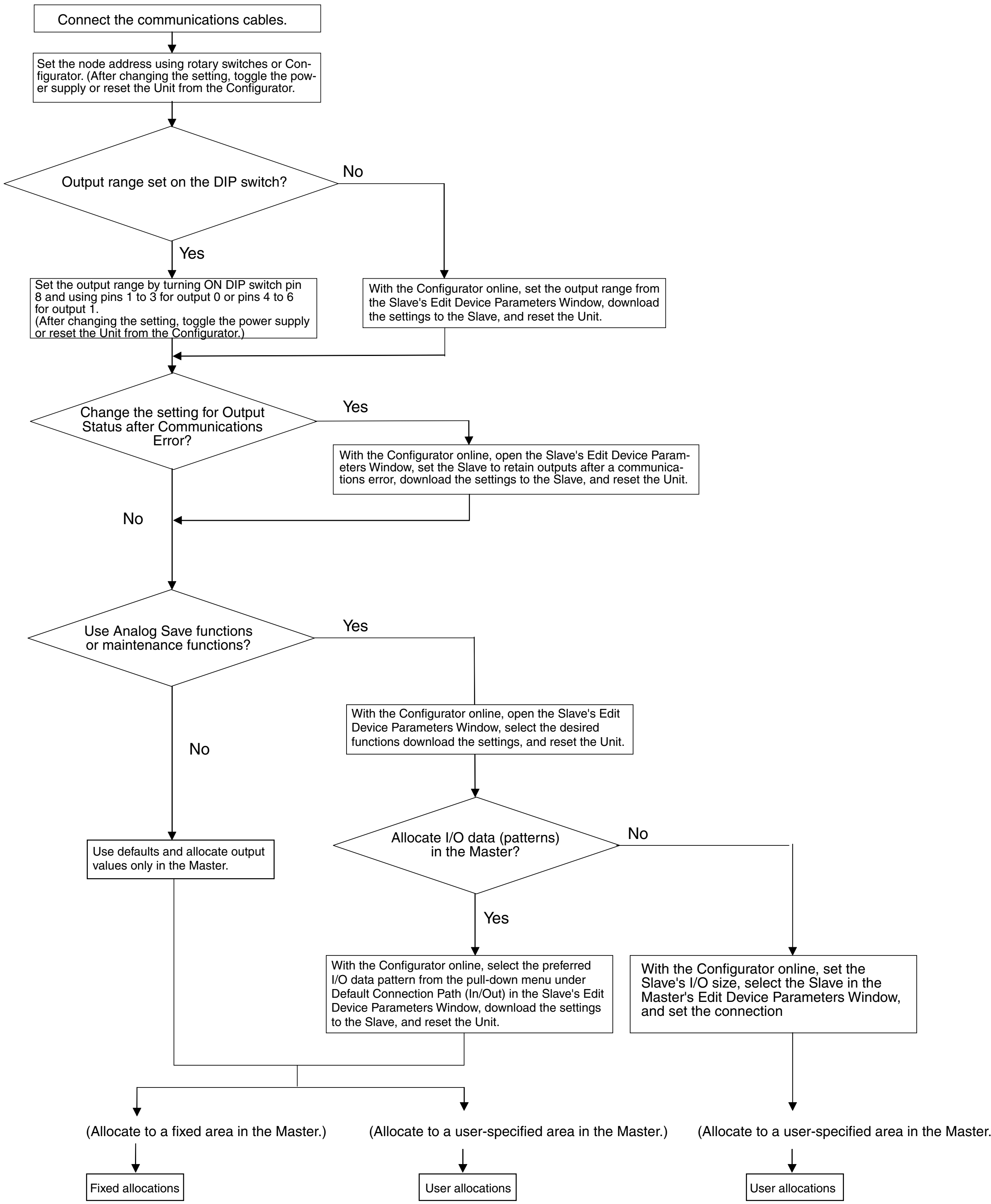
| Application | | Step 1 | Step 2 | Step 3 | |
|---|---|---|---|---|---|
| | | **Enable/disable functions** | **Select analog data** | **1. Allocate I/O data in fixed combinations** | **2. Allocate user-defined data in user-defined area** |
| | | **Set using the Configurator in the Slave's Edit Device Parameters Window** | | **Set using the Configurator under *Default Connection Path* in the Slave's Edit Device Parameters Window** | **Set using the Configurator under the Connection Tab in the Master's Edit Device Parameter Window** |
| **Allocating analog input only in the Master** | **Using default allocation** | Not required. | Not required. | Not required. | --- |
| | **Scaling with desired industry unit** | Set the scaling function. | Not required. | Not required. | --- |
| | **Averaging external analog inputs** | Set the moving average processing operation. | Not required. | Not required. | --- |
| **Allocating other values (not analog input) in the Master** | **Allocating the maximum (peak) or minimum (bottom) value in the Master** | Set the peak/bottom hold function. | Allocate the maximum (peak) or minimum (bottom) value as Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2. | Select an I/O data (pattern) that includes either Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2, and select the Hold Flag. | Specify either Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2, and the Hold Flag. |
| | **Allocating the top or valley value in the Master** | Set the top/valley hold function. | Allocate the top or valley value as Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2. | Select an I/O data (pattern) that includes Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2, and select the Hold Flag. | Specify either Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2, and the Hold Flag. |
| | **Allocating top or valley timing in the Master** | Set the top/valley hold function. | Not required. | Select an I/O data (pattern) that includes the Top/Valley Detection Timing Flag, and select the Hold Flag. | Specify the Top/Valley Detection Timing Flag and the Hold Flag. |
| | **Allocating the rate of change in the Master** | Set the rate of change operation function. | Allocate the rate of change value in Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2. | Select an I/O data (pattern) that includes Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2. | Specify either Analog Data 1, Analog Data 2, Temperature Data 1, or Temperature Data 2. |
| **Allocating the alarm output for analog input, peak/bottom, top/valley, or rate of change value in the Master** | | Set the HH, H, L, and LL alarms for the comparator function. | Allocate any of the analog data types in Analog Data 1 or Temperature Data 1. | Select an I/O data (pattern) that includes the Analog Status Flags. | Specify the Analog Status Flags. |
| **Monitoring the cumulated value from the Configurator.** | | Set the cumulative count function. | Not required. | Not required. | Not required. |

## 7-1-9 Application Procedure Flowchart

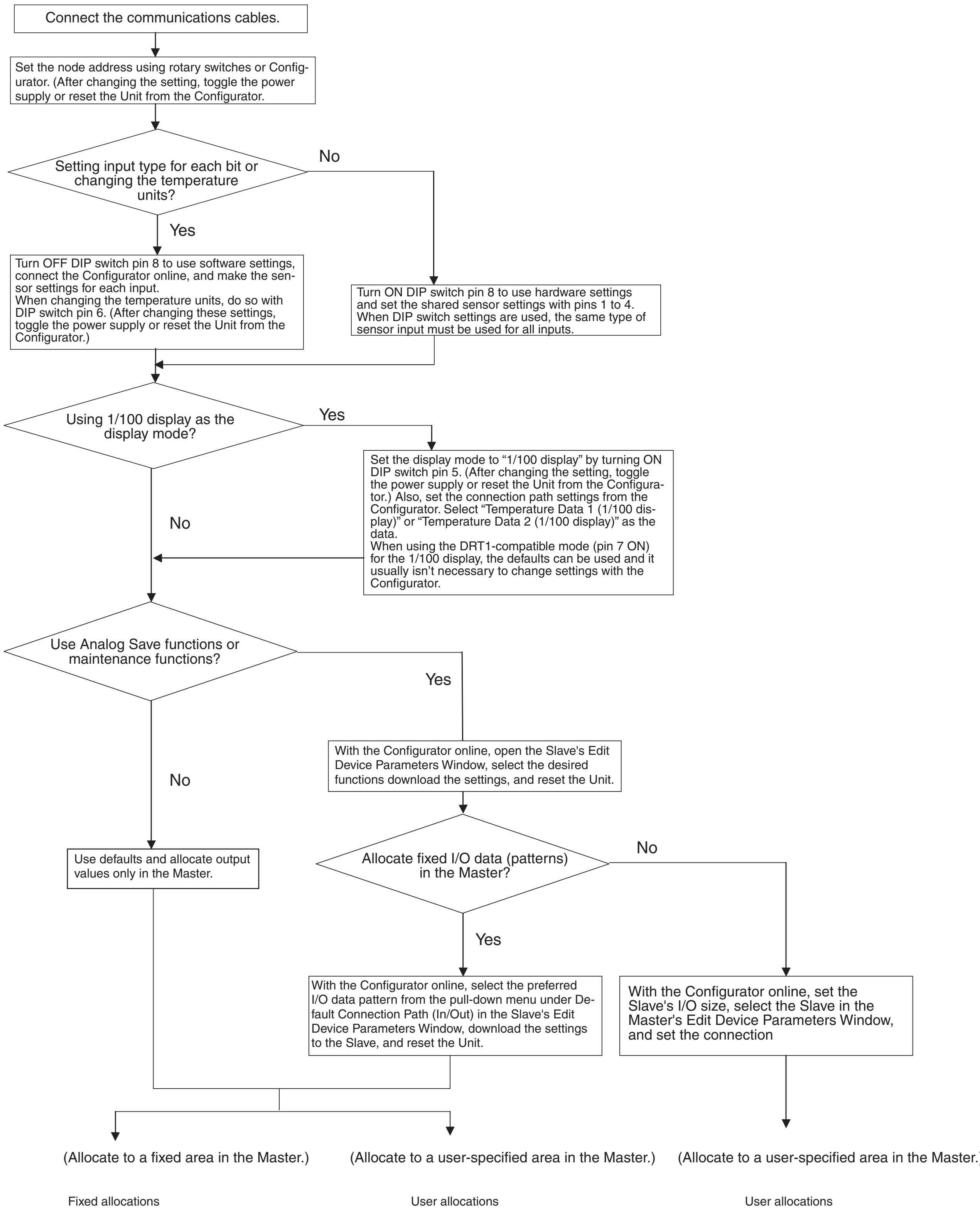
### Analog Input Terminals



## Analog Output Terminals



## Temperature Input Terminals



# 7-2 Common Procedures

## 7-2-1 Connecting Communications Cables

Communications cables are connected using the same methods as for General-purpose Slaves. Refer to *5-2 Connecting Communications Cables to General-purpose Slaves* for details.

## 7-2-2 Node Address and Baud Rate Settings

The Analog Slaves' node address and baud rate settings are described here.

Node address setting: Use rotary switch or the Configurator

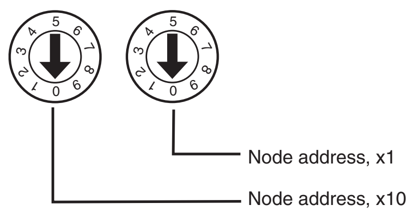
Baud rate setting: Automatically detected from the Master

### Node Address Settings

The node address of the Analog Slave is set as a decimal value using the left rotary switch for the ten's digit and the right rotary switch for the one's digit. (Up to 63 nodes can be set.)

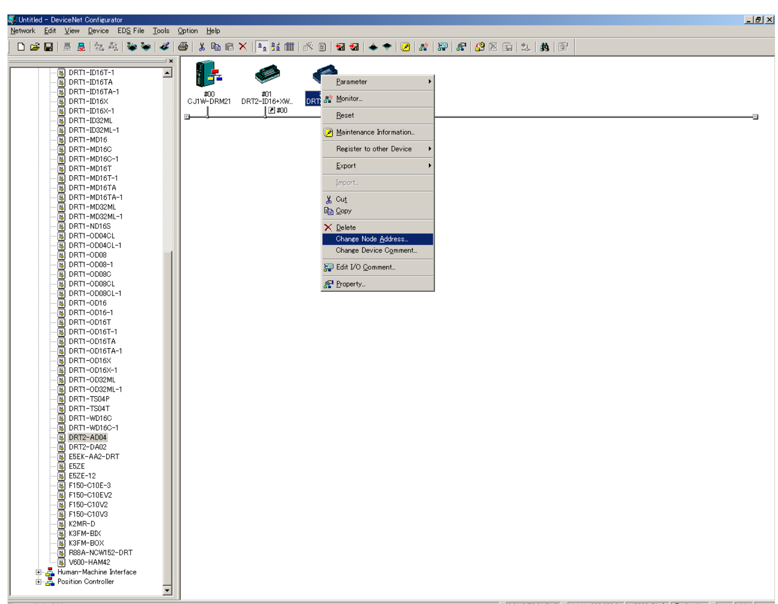
Node addresses 64 to 99 can be set using the Configurator using the following method.

**Note** The rotary switch settings are read when the power is turned ON.

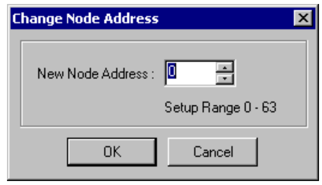



#### Setting Node Addresses Using the DeviceNet Configurator

***1,2,3...*** 1. Click the right mouse button over the icon of the corresponding DRT2 Analog Slave in the Network Configuration Window, and select ***Change Node Address***.



2. The following window will be displayed. Enter the node address.




3. Click the **OK** Button.

**Note** Any node address within the setting range can be used as long as it is not already set for another node. Setting the same node address for more than one node will cause a node address duplication error and communications will not start.

### Baud Rate Setting

The baud rate of the system is determined by the baud rate set for the Master Unit (automatic detection). Setting the baud rate for each Unit is not required.

## 7-2-3 Mounting in Control Panels

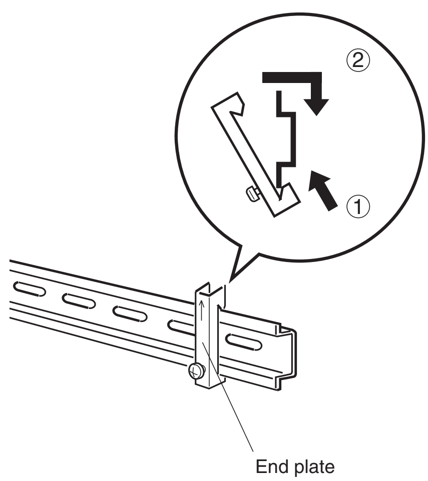
An Analog Slave can be mounted in a control panel using the following method.

### Using DIN Track

Mount the back of the Slave to a 35-mm DIN Track. To mount the Slave, pull down on the mounting hook on the back of the Unit with a screwdriver, latch the DIN Track onto the back of the Slave, and then secure the Slave to the DIN Track. Secure the Slaves by mounting End Plates on both sides of them.

**Connecting End Plates**

Hook the bottom of the End Plates onto the DIN Track, as shown at (1) in the following diagram, then hook the top of the End Plates as shown at (2).



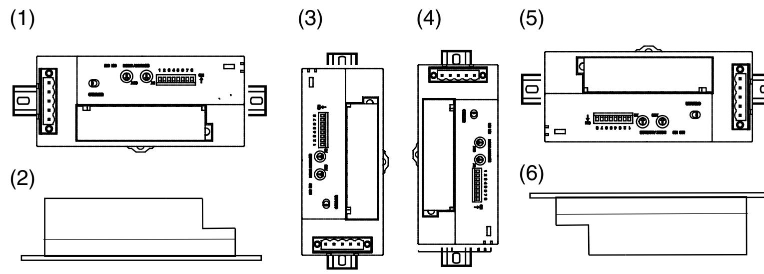

**Note** Always attach End Plates to both ends of Slaves connected to the DIN Track.

### Mounting Direction

Unless specific restrictions are given for the Slave, it can be mounted in any of the following six directions. The input accuracy of the DRT2-TS04T depends on the mounting method in some cases (see note).

**Note** The input accuracy of a DRT2-TS04T is slightly less accurate when the DRT2-TS04T is used to replace another Temperature Input Terminal and the existing Terminal Block is left in place. For details, refer to the *Performance*

*Specifications* in *7-6-1 DRT2-TS04T and DRT2-TS04P Temperature Input Terminals*.




## 7-2-4 Wiring the I/O Lines

The I/O lines are all wired to M3 screw terminals.

Connect M3 crimp terminals to the wires and then connect them to the Terminal Block.

Tighten the screws to a torque of 0.5 N·m.


# 7-3 Maintenance Information Window

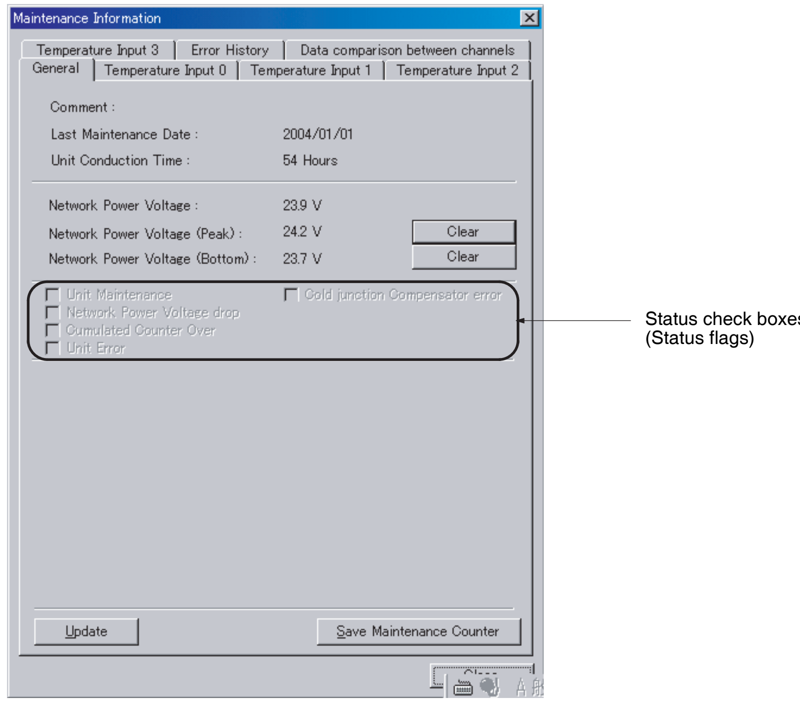
This section describes the Maintenance Information Window, which can be used to monitor the status of Analog Slaves. The Monitor Device Window can be used to check the same Slave status information, but the examples in this section uses the Maintenance Information Window. Refer to *4-1-2 Maintenance Mode Window* for details on the differences between the Maintenance Information Window and the Monitor Device Window.

## 7-3-1 Checking Maintenance Information

The Maintenance Mode Window can be opened in two ways.

1. Right-click the Main Window to display the popup menu and select ***Maintenance Information***.
2. Open the Maintenance Mode Window and double-click the desired Slave's icon.

## General Window




**Note** This explanation in this example uses a Temperature Input Terminal's Maintenance Information Window. The Tab name will be "Analog Input □" or "Analog Output □" for an Analog Terminal's Maintenance Information Window.

| Item | Description |
|---|---|
| Comment | Displays up to 32 characters of text set as the Unit comment. |
| Last Maintenance Date | Displays the last maintenance date that was set. |
| Unit Conduction Time | Displays the total time that the Unit has been ON (cumulative power ON time). |
| Network Power Voltage | Displays the present network power supply voltage. |
| Network Power Voltage (Peak) | Displays the maximum power supply voltage up to the present time. |
| Network Power Voltage (Bottom) | Displays the minimum power supply voltage up to the present time. |
| Update Button | Click this Button to update the Maintenance information. |
| Save Maintenance Counter | This function saves the Maintenance counter value in the Unit. If this function is used, the previous value will be retained when the power supply is turned OFF and ON again. |

**Note** Always update the information when the parameters have been edited or set.

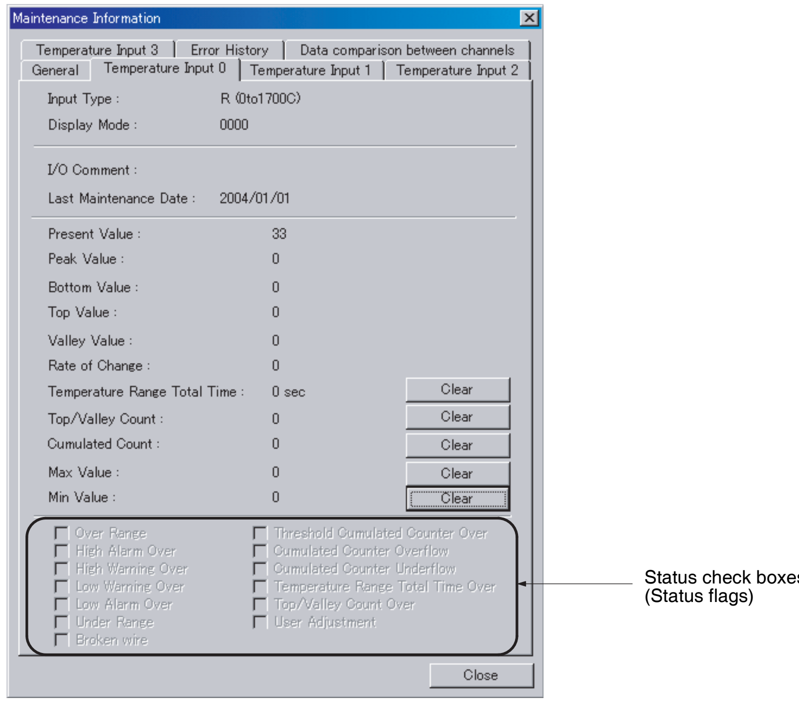
**Status Check Boxes**

The flags (check boxes) shown in the following table will be turned ON when the corresponding error occurs.

| Item | Description |
|---|---|
| Unit Maintenance | ON when the total Unit ON time exceeds the set value. |
| Network Power Voltage drop | ON when the network power supply voltage falls below the set value. |
| Cumulated Counter Over | ON when any one of the input's cumulative counter values exceeds the set value. |

| Item | Description |
|---|---|
| Unit Error | ON when a Unit Error has occurred in an Analog Unit. |
| Cold junction Compensator error (DRT2-TS04T only) | ON when there is an error in the cold junction compensator. |

## Individual Temperature Input Windows




### Display Area

| Item | Description |
|---|---|
| Input Type | Shows the present input sensor type. (DRT2-TS04□ only) |
| Display Mode | Indicates the number of digits displayed. (DRT2-TS04□ only)<br>0000: No decimal point<br>0000.0: Decimal point and significant digits to 0.1<br>0000.0: Decimal point and significant digits to 0.01 |
| I/O Comment | Displays up to 32 characters of text as a comment. A separate comment can be set for each input. |
| Last Maintenance Date | Displays the last maintenance date that was set. (All models.) |
| Present Value | Displays the present analog value. (All models.)<br>Displays values derived from the analog value, including the Peak, Bottom, Top, and Valley values, and Rate-of-change (DRT2-AD04□ and DRT2-TS04□), the Temperature Range Total Time and Top/Valley Count (DRT2-TS04□ only), and the Cumulated Count. For details, refer to each function's explanation and settings. |

### Status Check Boxes

#### Status Boxes Displayed for All Analog Slaves

| Item | Description |
|---|---|
| Threshold Cumulated Counter Over | ON when the cumulative counter value exceeds the set value. |
| Cumulated Counter Overflow | ON when there is an overflow in the cumulative counter value. |
| Cumulated Counter Underflow | ON when there is an underflow in the cumulative counter value. |

#### Status Boxes Displayed for the DRT2-AD04□ and DRT2-TS04□ Only

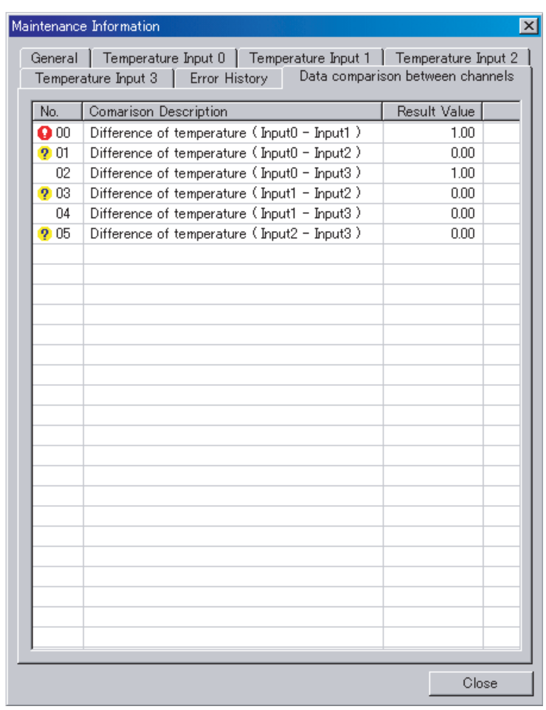
| Item | Description |
|---|---|
| Over Range/Under Range | ON when the analog data is above or below the displayable range. |
| Alarm Over/Warning Over | ON when the analog data is above or below the monitoring set values set in the comparator function. |
| Broken wire | ON when a wire is broken or disconnected. (Used only for Analog Input Terminals when the input range is 1 to 5 V or 4 to 20 mA.) |

#### Status Boxes Displayed for the DRT2-TS04□ Only

| Item | Description |
|---|---|
| Temperature Range Total Time Over | ON when the present value being counted in the set range exceeds the monitoring set value. |
| Top/Valley Count Over | ON when the top or valley count exceeds the monitoring set value. |
| User Adjustment | ON when the user-set adjustment function is operating. |

## Data Comparison between Channels Window (DRT2-TS04□ Only)

Each comparison number (No.) corresponds to the comparison of a pair of inputs.

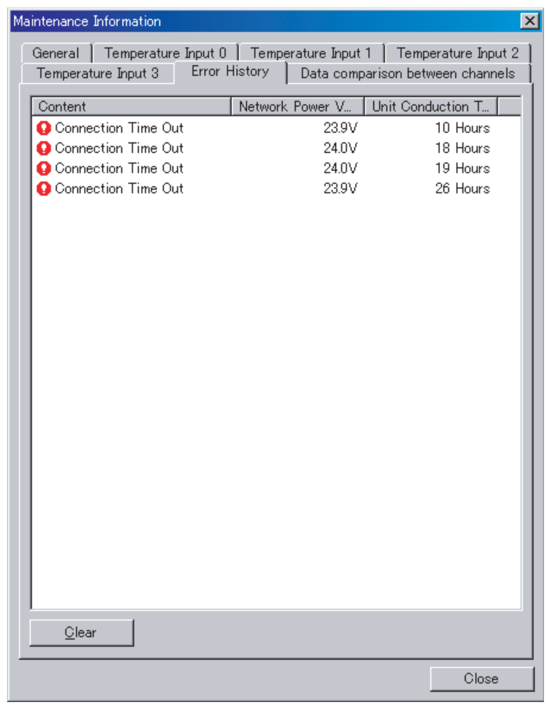


| Item | Description |
|---|---|
| Comparison Description | Displays the inputs used in the error calculation. |
| Result Value | Displays the calculation results. |

**Note**

1. When a result value exceeds the monitoring set value, a red alarm icon will be displayed to the left of the comparison number (No.).
2. When either of the comparison inputs is disconnected (off-wire detected), the result value will be set to 0.00 and a yellow alarm icon will be displayed to the left of the comparison number (No.).

## Error History Window




| Item | Description |
|---|---|
| Content | Displays the contents of the communications errors that occurred. |
| Network Power Voltage | Displays the power supply voltage being supplied when the error occurred. |
| Unit Conduction Time | Displays the total time that the network power supply had been ON when the error occurred. DRT2-TS04□ only) |
| Clear Button | Clears the error history. |

# 7-4 Analog Input Terminals

## 7-4-1 DRT2-AD04 and DRT2-AD04H Analog Input Terminals

### General Specifications

| Item | Specifications |
|---|---|
| Communications power supply voltage | 11 to 25 V DC (Supplied from the communications connector.) |
| Current consumption | DRT2-AD04: 90 mA max. (24 V DC), 150 mA max. (11 V DC)<br>DRT2-AD04H: 70 mA max. (24 V DC), 110 mA max. (11 V DC) |
| Noise immunity | Conforms to IEC61000-4-4. 2 kV (power lines) |
| Vibration resistance | 10 to 150 Hz, 0.7-mm double amplitude |
| Shock resistance | 150 $m/s^2$ |
| Dielectric strength | 500 V AC for 1 min. with 1-mA sensing current (between isolated circuits) |
| Ambient temperature | –10 to +55°C |
| Ambient humidity | 25% to 85% (with no condensation) |
| Operating environment | No corrosive gases |
| Storage temperature | –25 to +65°C |
| Mounting | 35-mm DIN Track mounting |
| Mounting strength | 50 N<br>In the direction of the Track: 10 N |
| Screw tightening torque | M3 (power supply, I/O terminals): 0.5 N·m |
| Weight | DRT2-AD04: 170 g max.<br>DRT2-AD04H: 160 g max. |

### Performance Specifications

**DRT2-AD04**

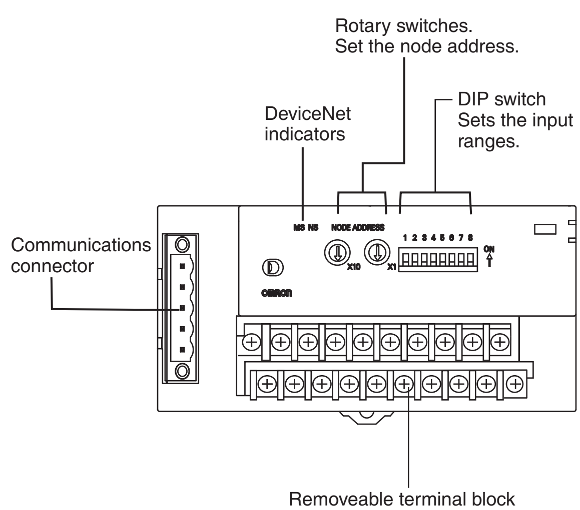
| Item | | Specifications | |
|---|---|---|---|
| | | Voltage input | Current input |
| Input points | | 4 points (Inputs 0 to 3) | |
| Input signal range | | 0 to 5 V<br>1 to 5 V<br>0 to 10 V<br>–10 to 10 V | 0 to 20 mA<br>4 to 20 mA |
| Input range setting method | | • DIP switch: Inputs 0 and 1 share same setting, and Inputs 2 and 3 share same setting.<br>• Configurator: Inputs 0 to 3 set separately. | |
| Maximum signal input | | ±15 V | ±30 mA |
| Input impedance | | 1 M Ω min. | Approximately 250 Ω |
| Resolution | | 1/6,000 (full scale) | |
| Overall accuracy | 25°C | ±0.3% FS | ±0.4% FS |
| | –10 to 55°C | ±0.6% FS | ±0.8% FS |
| Analog conversion cycle | | 4 ms max./ 4 points<br>**Note** When the DeviceNet communications cycle is 4 ms and math operations are not used. | |
| AD conversion data | | –10 to 10 V range: F448 to 0BB8 hex full scale (–3,000 to 3,000)<br>Other ranges: 0000 to 1770 hex full scale (0 to 6,000)<br>AD conversion range: ±5% FS of the above data ranges. | |
| Isolation method | | Photocoupler isolation (between input and communications lines)<br>No isolation between input signal wires | |

| Item | Specifications | |
|---|---|---|
| | Voltage input | Current input |
| I/O connection method | Terminal-block connection | |
| Standard accessories | 4 short bars for current input | |

**DRT2-AD04H**

| Item | | Specifications | |
|---|---|---|---|
| | | Voltage input | Current input |
| Input points | | 4 points (Inputs 0 to 3) | |
| Input signal range | | 0 to 5 V<br>1 to 5 V<br>0 to 10 V | 0 to 20 mA<br>4 to 20 mA |
| Input range setting method | | • DIP switch: Inputs 0 and 1 share same setting, and Inputs 2 and 3 share same setting.<br>• Configurator: Inputs 0 to 3 set separately. | |
| Maximum signal input | | ±15 V | ±30 mA |
| Input impedance | | 1 MΩ min. | Approximately 250 Ω |
| Resolution | | 1/30,000 (full scale) | |
| Overall accuracy | 25°C | ±0.3% FS | ±0.4% FS |
| | –10 to 55°C | ±0.6% FS | ±0.8% FS |
| Analog conversion cycle | | 4 points/250 ms max. | |
| AD conversion data | | 0000 to 7530 hex full scale<br>AD conversion range: ±5% FS of the above data ranges. | |
| Isolation method | | Photocoupler isolation (between input and communications lines and between input signal wires) | |
| I/O connection method | | Terminal-block connection | |
| Standard accessories | | 4 short bars for current input | |

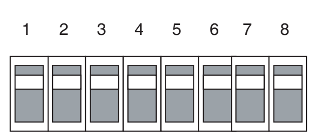
**Names and Functions of Parts**




## Setting the Input Signal Range

**Setting with the DIP Switch**

The input range can be set using the DIP switch or the Configurator.



Each pin is set according to the following table.

| Pin No. | Setting | Specifications |
|---|---|---|
| 1 | Input Terminal: Input range setting for Inputs 0 and 1. | Default setting: All pins OFF |
| 2 | | |
| 3 | | |
| 4 | Input Terminal: Input range setting for Inputs 2 and 3. | Default setting: All pins OFF |
| 5 | | |
| 6 | | |
| 7 | AD conversion data format setting | ON: Signed binary<br>OFF: Two's complement |
| 8 | Range setting method | OFF: Use Configurator.<br>ON: Use DIP switch.<br>The other DIP switch settings are disabled when pin 8 is OFF.<br>Default setting: OFF |

**Note**

1. When using the DRT2-AD04H, always set pin 7 to its default setting (OFF).
2. Always set pin 8 to ON if the DIP switch is used to set the ranges. If this pin is OFF, the DIP switch settings will not be enabled.
3. The DIP switch settings are read when the power is turned ON.

### Input Range Settings

#### ■ Inputs 0 and 1 (Shared Setting)

| Signal range | Pin 1 | Pin 2 | Pin 3 |
|---|---|---|---|
| 0 to 5 V | OFF | OFF | OFF |
| 1 to 5 V | ON | OFF | OFF |
| 0 to 10 V | OFF | ON | OFF |
| –10 to 10 V | ON | ON | OFF |
| 4 to 20 mA | OFF | OFF | ON |
| 0 to 20 mA | ON | OFF | ON |
| Cannot set for other ranges. | --- | --- | --- |

#### ■ Inputs 2 and 3 (Shared Setting)

| Signal range | Pin 4 | Pin 5 | Pin 6 |
|---|---|---|---|
| 0 to 5 V | OFF | OFF | OFF |
| 1 to 5 V | ON | OFF | OFF |
| 0 to 10 V | OFF | ON | OFF |
| –10 to 10 V | ON | ON | OFF |
| 4 to 20 mA | OFF | OFF | ON |
| 0 to 20 mA | ON | OFF | ON |
| Cannot set for other ranges. | --- | --- | --- |

**Note**

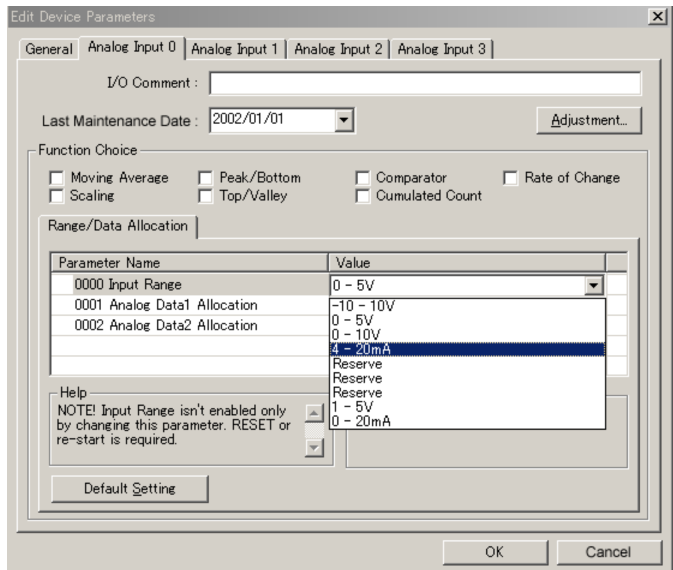
1. When the DIP switch is used to set the input ranges (pin 8 ON), the input signal ranges will always be the same for Inputs 0 and 1 and for Inputs 2 and 3. If it is necessary to set separate input signal ranges for Inputs 0 to 3, use the Configurator to make the settings rather than the DIP switch. When pin 8 is OFF, the other DIP switch settings are disabled.
2. When all the four inputs (inputs 0 to 3) are not being used in the DRT2-AD04, the number of AD conversion points can be set using the Configurator to speed up the conversion cycle for each input. Refer to *7-4-3 Functions and Settings* and *7-4-4 Calculating the Conversion Cycle (DRT2-AD04 Only)*.

**Setting Using the DeviceNet Configurator**

Use the following procedure to set the input range for each input using the Configurator.

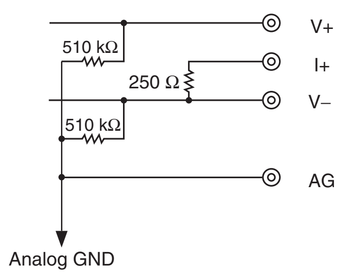
*1,2,3...*

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where the range is to be changed.
3. Select the desired range from the pull-down menu in the *Input Range* field.




4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

## Internal Circuits (DRT2-AD04 Only)

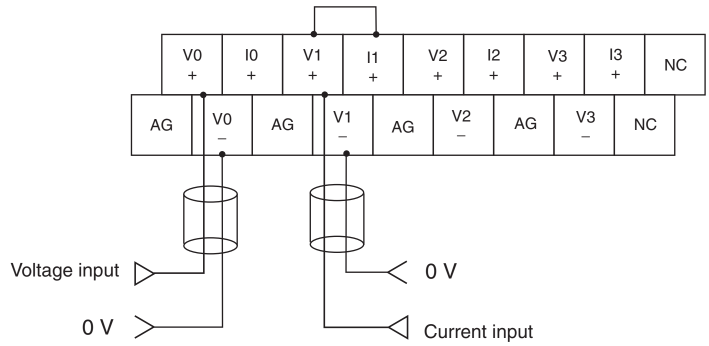



**Note** Since inputs are isolated from each other in the DRT2-AD04H, it is not necessary to be concerned with the structure of the internal circuits.

## Wiring

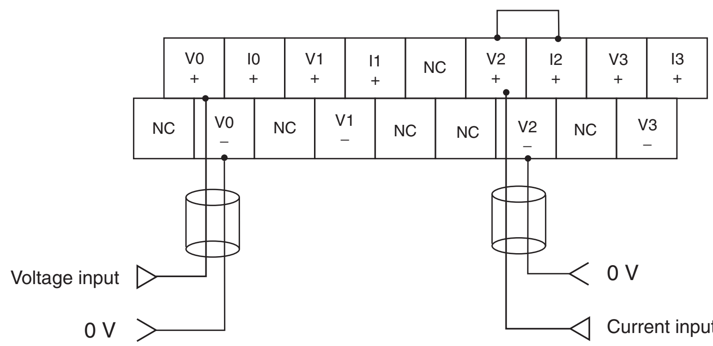
Connect the terminals of the Analog Input Terminal for each Input Unit according to the following diagrams, depending on whether a voltage input or a current input is being used.

**DRT2-AD04**




Short the corresponding V+ and I+ terminals when inputting a current, using the enclosed short bars.

**DRT2-AD04H**




Short the corresponding V+ and I+ terminals when inputting a current, using the enclosed short bars.

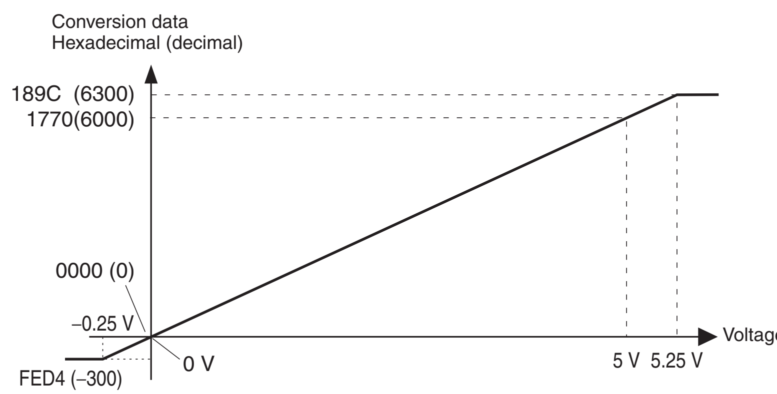
## Input Range and Conversion Data

The analog data that is input can be converted to digital data according to the input range, as described here. If the input exceeds the input range, the AD conversion data will be fixed at the upper or Low Limit.

**DRT2-AD04 Input Ranges**

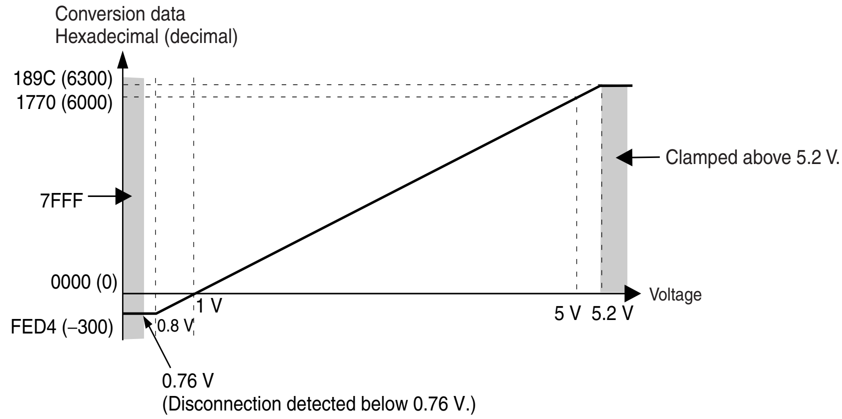
### ■ Input Range: 0 to 5 V

The voltage range 0 to 5 V corresponds to 0000 to 1770 hex (0 to 6,000). The convertible data range is FED4 to 189C hex (–300 to 6,300). Negative voltages are expressed as two's complements (16 bits). When a disconnection occurs, the data equivalent to 0 V input will be used (0000 hex).



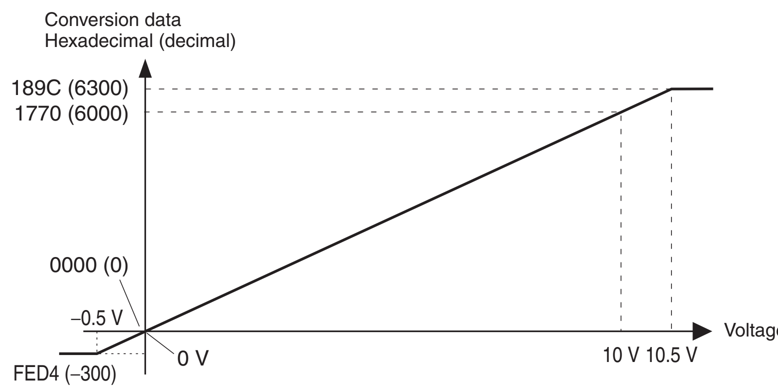
### ■ Input Range:1 to 5 V

The voltage range 1 to 5 V corresponds to 0000 to 1770 hex (0 to 6,000). The convertible data range is FED4 to 189C hex (–300 to 6,300). If a the input voltage falls below the input range (input voltage less than 0.76 V), a disconnection is detected and the data is set to 7FFF hex.



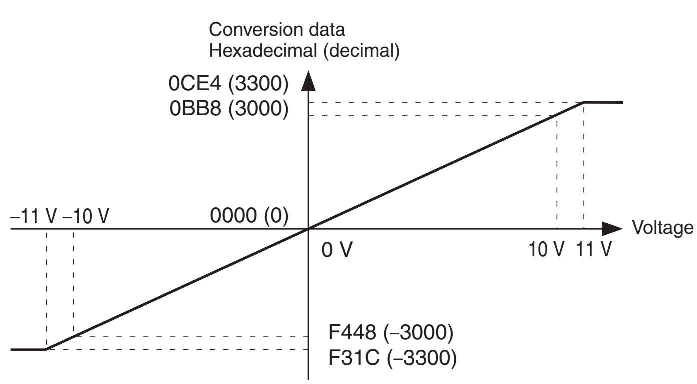

### ■ Input Range: 0 to 10 V

The voltage range 0 to 10 V corresponds to 0000 to 1770 hex (0 to 6,000). The convertible data range is FED4 to 189C hex (–300 to 6,300). Negative voltages are expressed as two's complements (16 bits). When a disconnection occurs, the data equivalent to 0 V input will be used (0000 hex).



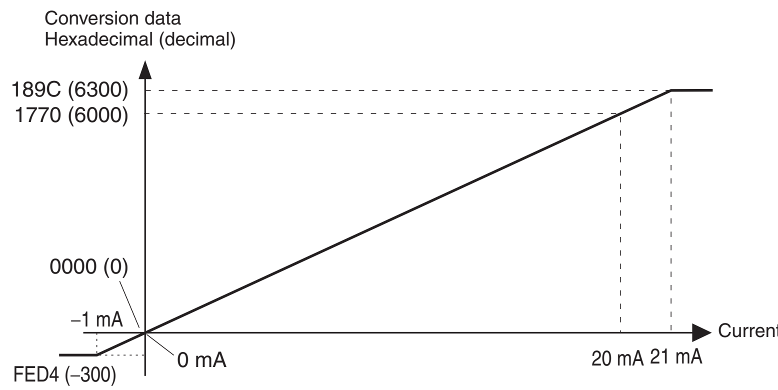

### ■ Input Range: –10 to 10 V

The voltage range –10 to 10 V corresponds to F448 to 0BB8 hex (–3,000 to 3,000). The convertible data range is F31C to 0CE4 hex (–3,300 to 3,300). Negative voltages are expressed as two's complements (16 bits). When a disconnection occurs, the data equivalent to 0 V input will be used (0000 hex).



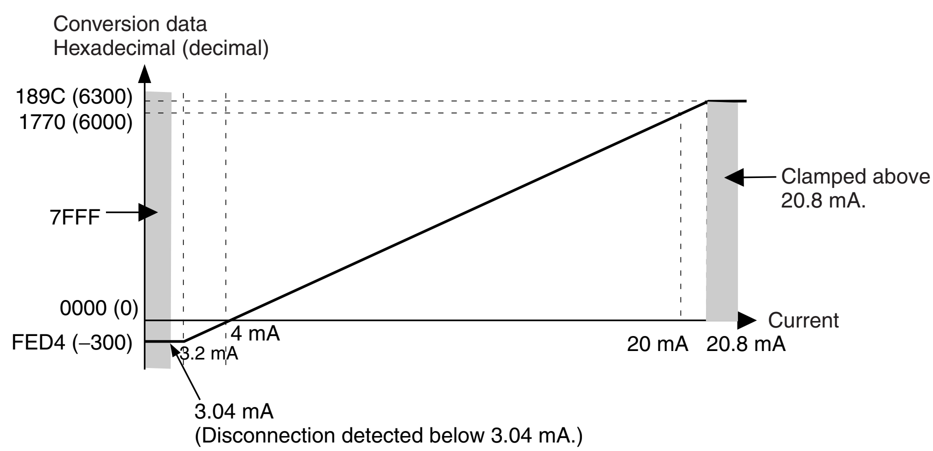
## ■ Input Range: 0 to 20 mA

The current range 0 to 20 mA corresponds to 0000 to 1770 hex (0 to 6,000). The convertible data range is FED4 to 189C hex (–300 to 6,300). Negative currents are expressed as two's complements (16 bits). When a disconnection occurs, the data equivalent to 0 mA input will be used (0000 hex).




## ■ Input Range: 4 to 20 mA

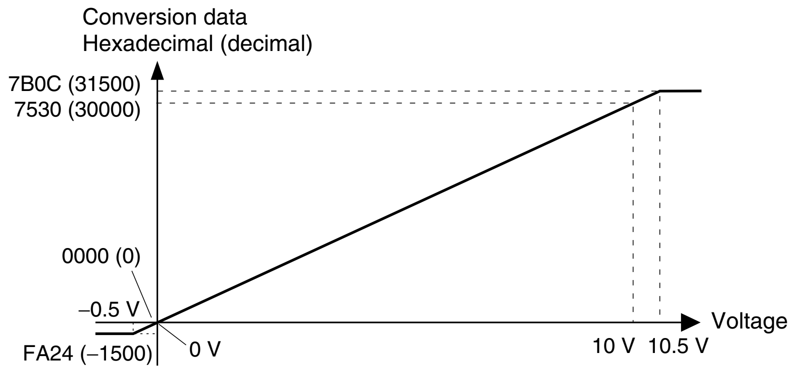
The current range 4 to 20 mA corresponds to 0000 to 1770 hex (0 to 6,000). The convertible data range is FED4 to 189C hex (–300 to 6,300). If the input current is below the input range (input current less than 3.04 mA), a disconnection is detected and the data is set to 7FFF hex.



### DRT2-AD04H Input Ranges

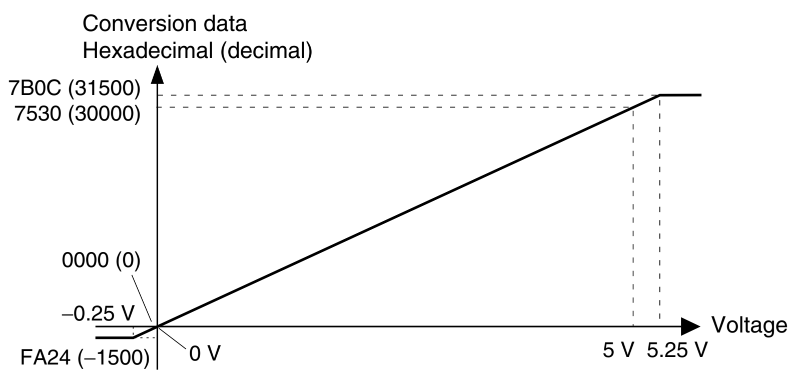
#### ■ Input Range: 0 to 10 V

The voltage range 0 to 10 V corresponds to 0000 to 7530 hex (0 to 30,000). The convertible data range is FA24 to 7B0C hex (–1,500 to 31,500). Negative voltages are expressed as two's complements.



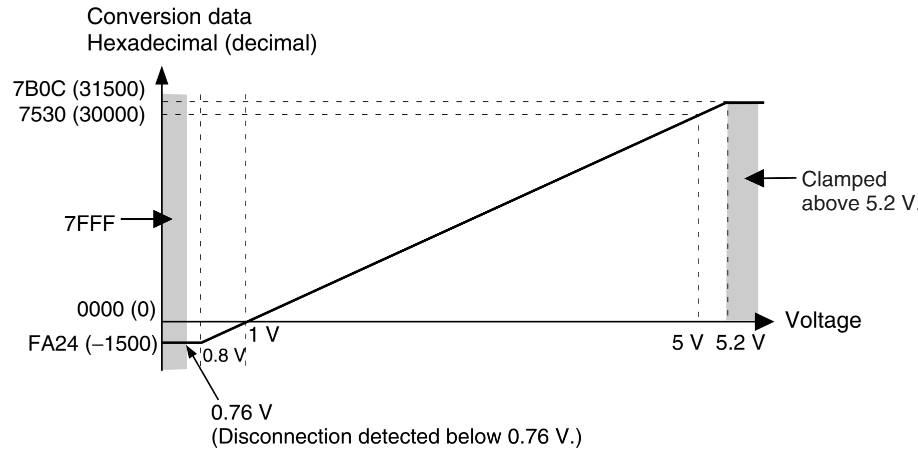

#### ■ Input Range: 0 to 5 V

The voltage range 0 to 5V corresponds to 0000 to 7530 hex (0 to 30,000). The convertible data range is FA24 to 7B0C hex (–1,500 to 31,500). Negative voltages are expressed as two's complements.



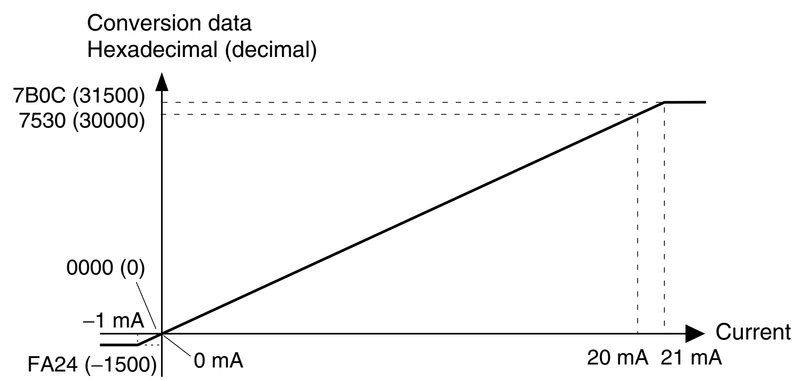
## ■ Input Range:1 to 5 V

The voltage range 1 to 5 V corresponds to 0000 to 7530 hex (0 to 30,000). The convertible data range is FA24 to 7B0C hex (–1,500 to 31,500). The voltage range 0.8 to 1 V corresponds to FA24 to 0000 hex (–1,500 to 0). If a the input voltage falls below the input range (input voltage less than 0.76 V), a disconnection is detected and the data is set to 7FFF hex.



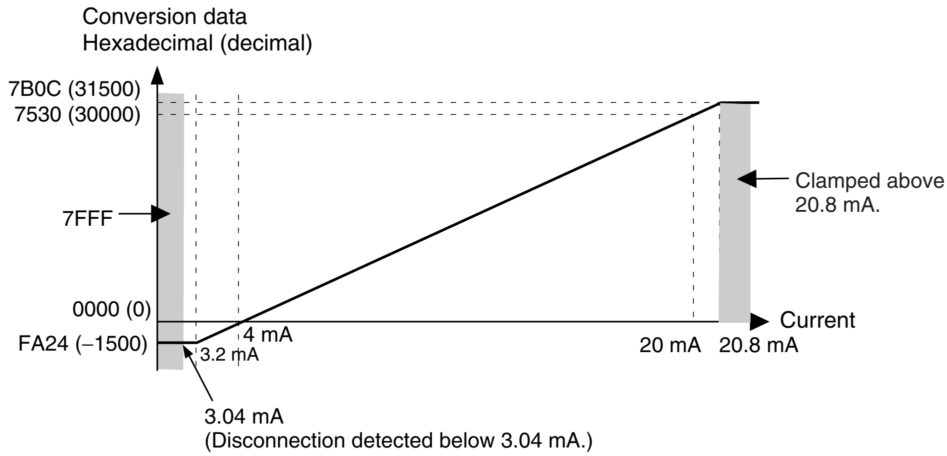

## ■ Input Range: 0 to 20 mA

The current range 0 to 20 mA corresponds to 0000 to 7530 hex (0 to 30,000). The convertible data range is FA24 to 7B0C hex (–1,500 to 31,500). Negative voltages are expressed as two’s complements.



### ■ Input Range: 4 to 20 mA

The current range 0 to 20 mA corresponds to 0000 to 7530 hex (0 to 30,000). The convertible data range is FA24 to 7B0C hex (–1,500 to 31,500).
The current range 3.2 to 4 mA corresponds to FA24 to 0000 hex (–1,500 to 0). If the input current is below the input range (input current less than 3.04 mA), a disconnection is detected and the data is set to 7FFF hex.




## AD Conversion Data

Negative AD conversion data is expressed as two's complements. The NEG instruction (two's complement conversion) can be used to obtain the absolute value of the two's complement. When pin 7 of the DIP Switch is turned ON, the AD conversion data will be expressed in signed binary.

| | 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |
|---|---|
| Word +0 | Input 0 AD conversion data |
| Word +1 | Input 1 AD conversion data |
| Word +2 | Input 2 AD conversion data |
| Word +3 | Input 3 AD conversion data |

## Conversion Speed

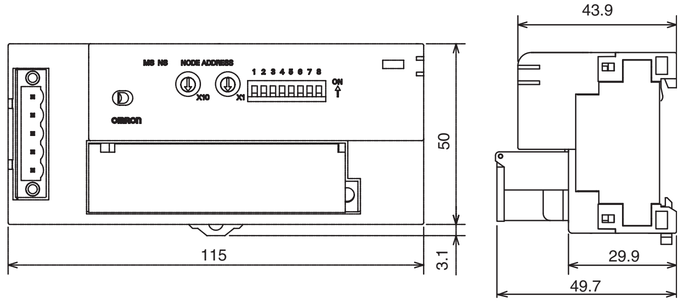
**DRT2-AD04**

The AD conversion data for 4 input points is refreshed every 3.82 s max., although the conversion speed will vary depending on the functions and number of AD conversion points being used. Refer to *7-4-4 Calculating the Conversion Cycle (DRT2-AD04 Only)* for details.

**DRT2-AD04H**

The AD conversion data is refreshed every 250 ms. After a step response is input, however, it may take up to 650 ms until 90% of the input value is reached and the AD conversion data can be transferred.

## Dimensions




## 7-4-2 I/O Data Allocation Methods

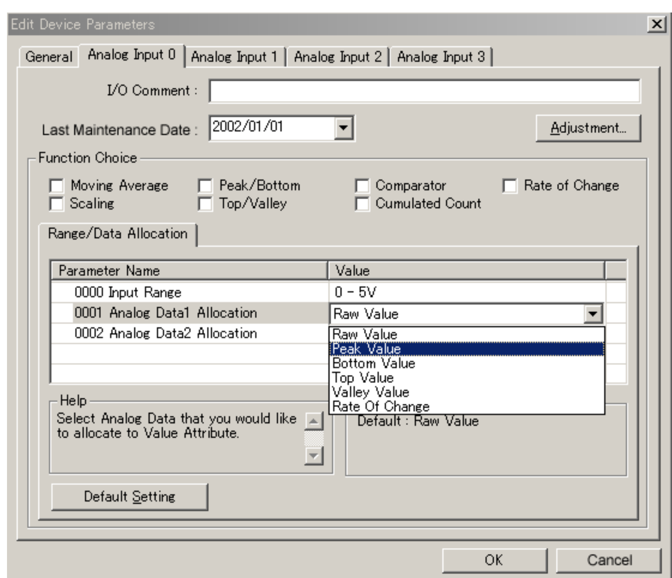
### Selecting Analog Data

After performing math operations, up to two of the six resulting values can be selected to allocate in the Master (one type each for Analog Data 1 and Analog Data 2). Select from analog input value, peak value, bottom value, top value, valley value, and rate of change. The selected data is allocated in the Master individually or in combination with Status Flags. The following methods can be used to select the analog data.

#### Using the Configurator

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the Tab Page for the input where analog data is to be selected. From the data on which math operations have been performed, select two types of data from the pull-down menu as Analog Data 1 and Analog Data 2.




3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## Allocating I/O Data in the Master

Use one of the following methods to select data for allocating in the Master and then perform remote I/O communications.

*1,2,3...*
1. Allocating only analog input values (default I/O data) in the Master.
2. Allocating selected I/O data (patterns) in the Master (fixed I/O data combinations).
3. Allocating user-defined I/O data in the Master (user-defined I/O data combinations).

### ■ Allocating Analog Input Values (Default I/O Data) Only

When using the Analog Input Terminal's default settings, only the analog input values are selected as I/O data and allocated in the four words (eight bytes) of the Master's IN Area, as shown in the following diagram.

| 15 ... 0 |
|---|
| Analog input value for Input 0 |
| Analog input value for Input 1 |
| Analog input value for Input 2 |
| Analog input value for Input 3 |

### ■ Allocating Selected I/O Data (Patterns)

The analog data selected from the data on which math operations have been performed is combined with other data such as Status Flags and allocated in the Master.

Example: Allocating Analog Data 1 + Top/Valley Detection Timing Flags in the Master.

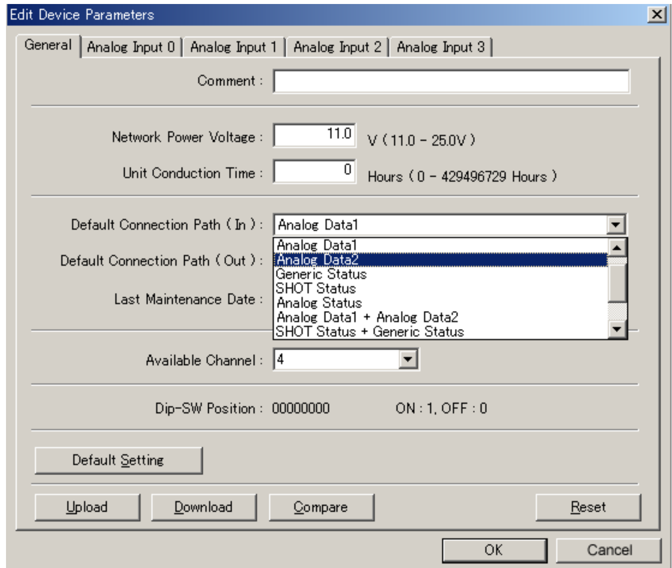
| 15 ... 8 | 7 ... 0 |
|---|---|
| Analog Data 1 for Input 0 | |
| Analog Data 1 for Input 1 | |
| Analog Data 1 for Input 2 | |
| Analog Data 1 for Input 3 | |
| Top Detection Timing Flag | Valley Detection Timing Flag |

The following method can be used to allocate data from the Configurator.

**Setting Using the DeviceNet Configurator**

*1,2,3...*
1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Click the **General** Tab and select the desired I/O data (pattern) from the pull-down menu under the *Default Connection Path (in)* field. In the following example, Analog Data 1 and Analog Data 2 are both allocated.




3. Click the **Download** Button and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

### ■ Allocating User-defined I/O Data (Any I/O Data Combination)

The analog data selected from the data on which math operations have been performed can be allocated in the Master with other data such as Status Flags, in any combination. The Configurator can be used to allocate two data patterns in the Master with any combination.
This method is supported by CS/CJ-series DeviceNet Master Units only.

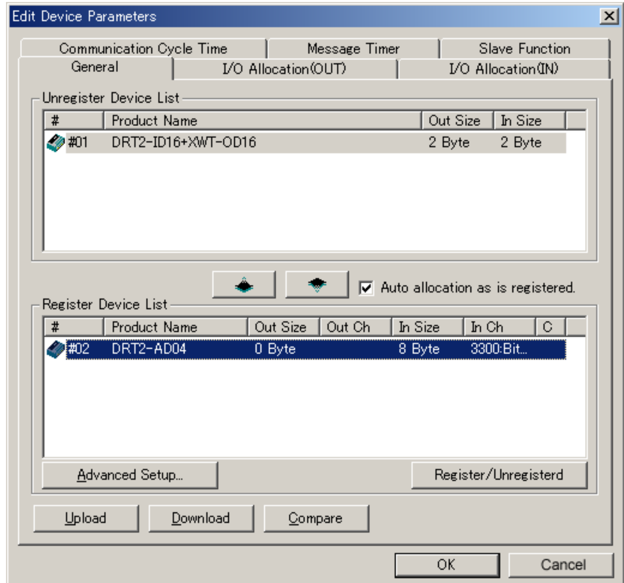
**Note** Priority is given to settings in the Master, so the setting for the Slave's default connection path is not required.

Use the following method to allocate data from the Configurator.

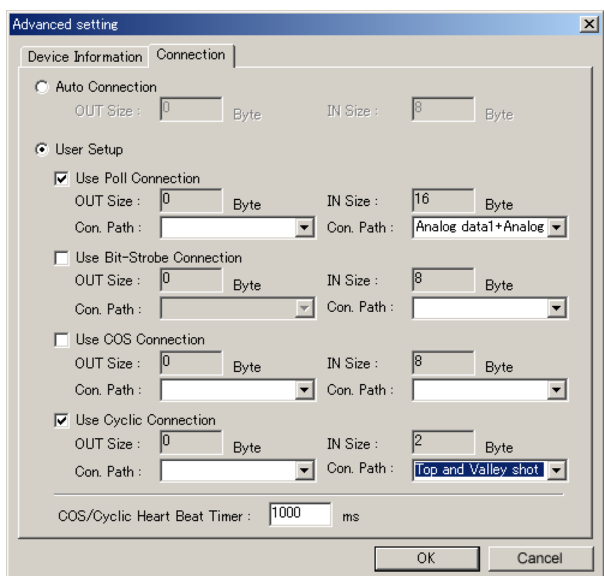
***1,2,3...***

1. Double-click the icon of the Master Unit to which I/O will be allocated and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Master Unit icon and select ***Parameters*** and ***Edit***.)

2. Click the **General** Tab, select the Analog Slave to be set, and click the **Advanced Setup** Button.

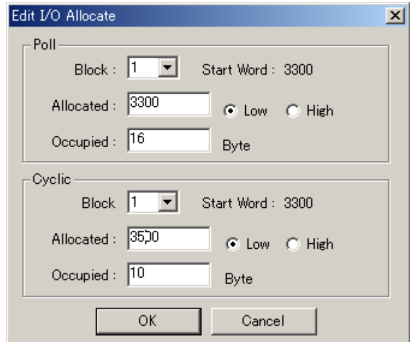



3. Click the **Connection** Tab, and select ***User Setup***. Select ***Use Poll Connection***, and then select the I/O data (pattern) from the pull-down menu for the connection path. In the same way, select ***Use Cyclic Connection***, and then select any I/O data (pattern) from the pull-down menu for the connection path.

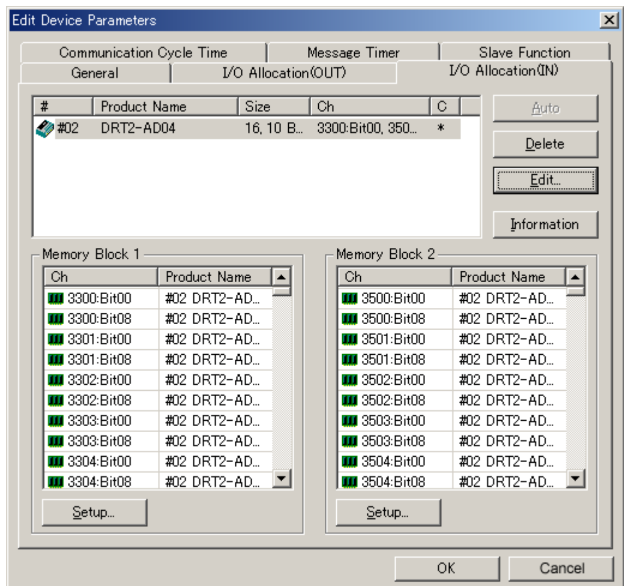



4. Click the **OK** Button and exit the window.
5. Click the **I/O Allocation (IN)** Tab and edit the I/O allocations.
   Select the Smart Slave to be set and click the **Edit** Button to display the Edit I/O Allocate Window.
   Set the *Poll* settings (Analog Data 1 + Analog Data 2 in this example) to block 1, allocated 3300 (word CIO 3300).
   Set the Cyclic settings (Analog Data 1 + Top/Valley Detection Timing Flags

+ Generic Status Flags in this example) to block 2, allocated 3500 (word CIO 3500).




6. Click the **OK** Button and use the following window to confirm that I/O has been allocated correctly.




7. Click the **OK** Button, return to the **General** Tab, and click the **Download** Button.

   **Note** Do not allocate a COS connection for Analog Data 1 or 2. If a COS connection is allocated for analog data, a frame will be transmitted to the host at every count change. Analog data changes frequently, causing frames to be sent frequently, increasing network traffic. This will increase the communications cycle time.

## I/O Data

**Analog Data 1 (Instance 104)**

Analog Data 1 is used to monitor analog values. Analog input value is allocated as the default setting, but any one of analog input value, peak value, bottom value, top value, valley value or rate of change can be selected as allocation data.

**Note** The comparator function can be used for the data allocated in Analog Data 1.

The data format used for allocating data in the Master is shown below. Data is allocated as two's complements (8 bytes = 4 words).

| 15 ... 0 |
|---|
| **Analog Data 1 for Input 0** |
| **Analog Data 1 for Input 1** |
| **Analog Data 1 for Input 2** |
| **Analog Data 1 for Input 3** |

**Analog Data 2 (Instance 114)**

Analog Data 2 is used to monitor other analog data in addition to that in Analog Data 1. Select one type of following data other than that allocated for Analog Data 1: Analog input value, peak value, bottom value, top value, valley value, or rate of change.

**Note** The comparator function cannot be used with Analog Data 2.

The data format used for allocating data in the Master is shown below. Data is allocated as two's complements (8 bytes = 4 words).

| 15 ... 0 |
|---|
| **Analog Data 2 for Input 0** |
| **Analog Data 2 for Input 1** |
| **Analog Data 2 for Input 2** |
| **Analog Data 2 for Input 3** |

**Generic Status Flags (Instance 121)**

The Generic Status Flags are used to monitor flags that indicate maintenance information (Network Power Voltage Monitor Flag, Unit Conduction Time Monitor Flag, and Analog Cumulative Counter Flag). The following data format is used for allocating flags in the Master (1 byte).

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The details of each bit are shown in the following table.

| Bit | Abbreviation | Name | Details |
|---|---|---|---|
| 0 | --- | --- | Reserved. (Always 0.) |
| 1 | --- | --- | Reserved. (Always 0.) |
| 2 | NPW | Network Power Voltage Monitor Flag | Turns ON when the Network power level drops below the set monitor value. |
| 3 | RHW | Unit Conduction Time Monitor Flag | Turns ON when the Unit ON time exceeds the set monitor value. |
| 4 | CCW | Analog Cumulative Counter Flag | Turns ON when any of the cumulated analog values exceeds the set monitor value. |
| 5 | MRF | Unit Error Flag | Turns ON when analog conversion stops due to a Unit error. |
| 6 | --- | --- | Reserved. (Always 0.) |
| 7 | --- | --- | Reserved. (Always 0.) |

The following format is used when Generic Status Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15 ... 8 | 7 ... 0 |
|---|---|---|
| +0 | | Generic Status Flags |

**Top/Valley Detection Timing Flags (Instance 132)**

These flags turn ON for the one-shot time when detecting the top or valley for the top/valley hold function.

These flags are used to time reading the values held as the top and valley values at the Master. The following data format is used when these flags are allocated in the Master (2 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |

The details of each byte are shown in the following table.

| Byte | Abbreviation | Name | Details |
|---|---|---|---|
| +0 | V_STx | Valley Detection Timing Flag | Turns ON when a valley is detected by the valley hold function and then turns OFF after the one-shot time has elapsed. |
| +1 | T_STx | Top Detection Timing Flag | Turns ON when a top is detected by the top hold function and then turns OFF after the one-shot time has elapsed. |

**Note** The one-shot time can be changed. For details, refer to the one-shot time settings for the top/valley hold function.

The following format is used when the Top/Valley Detection Timing Flags are allocated, starting from the rightmost byte of the Master

| Word | 15 to 12 | 11 to 8 | 7 to 4 | 3 to 0 |
|---|---|---|---|---|
| +0 | | Top Detection Timing Flag | | Valley Detection Timing Flag |

**Analog Status Flags (Instance 134)**

The Analog Status Flags include allocations for the Comparator Result Flag, the Top/Valley Detection Timing Flags, and the Off-wire Detection Flags. These flags are used for detection and monitoring.

The data format used for each byte when these flags are allocated in the Master is shown below (4 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|---|---|---|---|---|---|---|---|---|---|
| +0 | BW0 | T_ST0 | V_ST0 | HH | H | PS0 | L | LL | Input 0 |
| +1 | BW1 | T_ST1 | V_ST1 | HH | H | PS1 | L | LL | Input 1 |
| +2 | BW2 | T_ST2 | V_ST2 | HH | H | PS2 | L | LL | Input 2 |
| +3 | BW3 | T_ST3 | V_ST3 | HH | H | PS3 | L | LL | Input 3 |

The details for each bit are shown in the following table.

| Bit | Abbrevi-ation | Name | | Details |
|---|---|---|---|---|
| 0 | LLx | Comparator result | Low Low Limit Alarm Flag | Turns ON when the value of data allocated in Analog Data 1 drops below the Low Low Limit alarm setting. |
| 1 | Lx | | Low Limit Alarm Flag | Turns ON when the value of data allocated in Analog Data 1 drops below the Low Limit alarm setting. |
| 2 | PSx | | Normal Flag (pass signal) | Turns ON when none of the alarms (High High Limit, High Limit, Low Low Limit, and Low Limit) have been output. |
| 3 | Hx | | High Limit Alarm Flag | Turns ON when the value of data allocated in Analog Data 1 exceeds the High Limit alarm setting. |
| 4 | HHx | | High High Limit Alarm Flag | Turns ON when the value of data allocated in Analog Data 1 exceeds the High High Limit alarm setting. |
| 5 | V_STx | Top/valley detection timing | Valley Detection Timing Flag | Used with the valley hold function. Turns ON when a valley is detected, and turns OFF after the one-shot time has lapsed. |
| 6 | T_STx | | Top Detection Timing Flag | Used with the top hold function. Turns ON when a top is detected, and turns OFF after the one-shot time has lapsed. |
| 7 | BWx | Off-wire Detection Flag | | Turns ON when a disconnection is detected. |

The following format is used when Analog Status Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15 … 8 | 7 … 0 |
|---|---|---|
| +0 | For Input 1 | For Input 0 |
| +1 | For Input 3 | For Input 2 |

**Analog Data 1 + Analog Data 2 (Instance 144)**

This data pattern consists of Analog Data 1 followed by Analog Data 2 and is allocated in the Master using the following data format. Negative data values are given as two's complements (16 bytes = 8 words).

| Word | 15 … 0 |
|---|---|
| +0 | Analog Data 1 for Input 0 |
| +1 | Analog Data 1 for Input 1 |
| +2 | Analog Data 1 for Input 2 |
| +3 | Analog Data 1 for Input 3 |
| +4 | Analog Data 2 for Input 0 |
| +5 | Analog Data 2 for Input 1 |
| +6 | Analog Data 2 for Input 2 |
| +7 | Analog Data 2 for Input 3 |

**Top/Valley Detection Timing Flags + Generic Status Flags (Instance 151)**

This data pattern consists of the Top/Valley Detection Timing Flags followed by Generic Status Flags and is allocated in the Master using the following data format, shown by byte (3 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |
| +2 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | | Top Detection Timing Flags | | Valley Detection Timing Flags |
| +1 | | | Generic Status Flags | |

**Analog Status Flags + Generic Status Flags (Instance 164)**

This data pattern consists of Analog Status Flags followed by Generic Status Flags and is allocated in the Master using the following data format, shown by byte (5 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|---|---|---|---|---|---|---|---|---|---|
| +0 | BD0 | T_ST0 | V_ST0 | HH | H | PS0 | LL | L | Input 0 |
| +1 | BD1 | T_ST1 | V_ST1 | HH | H | PS1 | LL | L | Input 1 |
| +2 | BD2 | T_ST2 | V_ST2 | HH | H | PS2 | LL | L | Input 2 |
| +3 | BD3 | T_ST3 | V_ST3 | HH | H | PS3 | LL | L | Input 3 |
| +4 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 to 8 | 7 to 0 |
|---|---|---|
| +0 | For Input 1 | For Input 0 |
| +1 | For Input 3 | For Input 2 |
| +2 | | Generic Status Flags |

**Analog Data 1 + Top/Valley Detection Timing Flags (Instance174)**

This data pattern consists of Analog Data 1 followed by the Top/Valley Detection Timing Flags and is allocated in the Master using the following data format (10 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | Analog Data 1 for Input 0 | | | | | | | |
| +1 | | | | | | | | |
| +2 | Analog Data 1 for Input 1 | | | | | | | |
| +3 | | | | | | | | |
| +4 | Analog Data 1 for Input 2 | | | | | | | |
| +5 | | | | | | | | |
| +6 | Analog Data 1 for Input 3 | | | | | | | |
| +7 | | | | | | | | |
| +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Analog Data 1 for Input 0 | | | |
| +1 | Analog Data 1 for Input 1 | | | |
| +2 | Analog Data 1 for Input 2 | | | |
| +3 | Analog Data 1 for Input 3 | | | |
| +4 | | Top Detection Timing Flags | | Valley Detection Timing Flags |

**Analog Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags (Instance 184)**

This data pattern consists of Analog Data 1 followed by the Top/Valley Detection Timing Flags and then the Generic Status Flags and is allocated in the Master using the following data format, shown by byte (11 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | **Analog Data 1 for Input 0** | | | | | | | |
| +1 | | | | | | | | |
| +2 | **Analog Data 1 for Input 1** | | | | | | | |
| +3 | | | | | | | | |
| +4 | **Analog Data 1 for Input 2** | | | | | | | |
| +5 | | | | | | | | |
| +6 | **Analog Data 1 for Input 3** | | | | | | | |
| +7 | | | | | | | | |
| +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |
| +10 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The following format is used when this data pattern is allocated starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Analog Data 1 for Input 0 | | | |
| +1 | Analog Data 1 for Input 1 | | | |
| +2 | Analog Data 1 for Input 2 | | | |
| +3 | Analog Data 1 for Input 3 | | | |
| +4 | | Top Detection Timing Flags | | Valley Detection Timing Flags |
| | | | Generic Status Flags | |

**Hold Flags (Output) (Instance 190)**

Hold Flags are used with the peak/bottom hold and top/valley hold functions. The Hold Flags are used to control the hold execution timing from the Master and are allocated in the Master using the following data format (1 byte).

**Note** A delay may occur between when the Master's power is turned ON until notification of the Hold Flag status is sent to the Slave.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | | | | | HD3 | HD2 | HD1 | HD0 |

The details for each bit are shown in the following table.

| Bit | Abbreviation | Name | Details |
|---|---|---|---|
| **0** | **HD0** | Hold Flag for Input 0 | The hold function is performed for Analog Input 0 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **1** | **HD1** | Hold Flag for Input 1 | The hold function is performed for Analog Input 1 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **2** | **HD2** | Hold Flag for Input 2 | The hold function is performed for Analog Input 2 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **3** | **HD3** | Hold Flag for Input 3 | The hold function is performed for Analog Input 3 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |

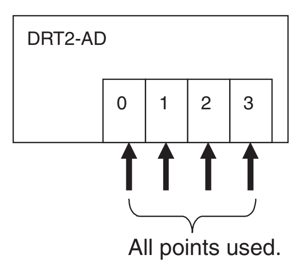
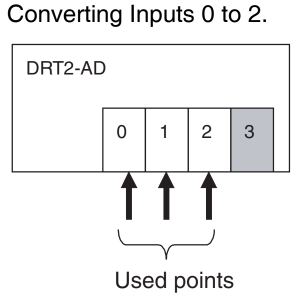
The following format is used when the Hold Flags are allocated, starting from the rightmost byte of the Master.

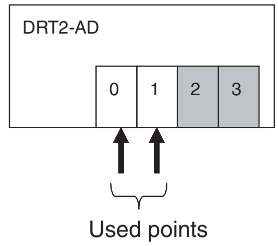
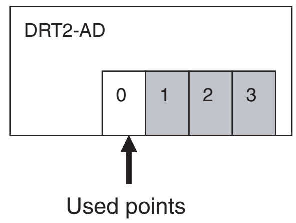
| Word | 15 to 8 | 7 to 0 |
|---|---|---|
| **+0** | | **Hold Flags** |

## 7-4-3 Functions and Settings

### Setting the Number of AD Conversion Points (DRT2-AD04 Only)

Normally, when using a four-point Input Unit, the values for the four inputs are converted in sequence. The setting can be changed, however, so that unused inputs are not converted. By reducing the number of conversion points, the conversion cycle speed is increased. For details on conversion cycle time, refer to *7-4-4 Calculating the Conversion Cycle (DRT2-AD04 Only).*

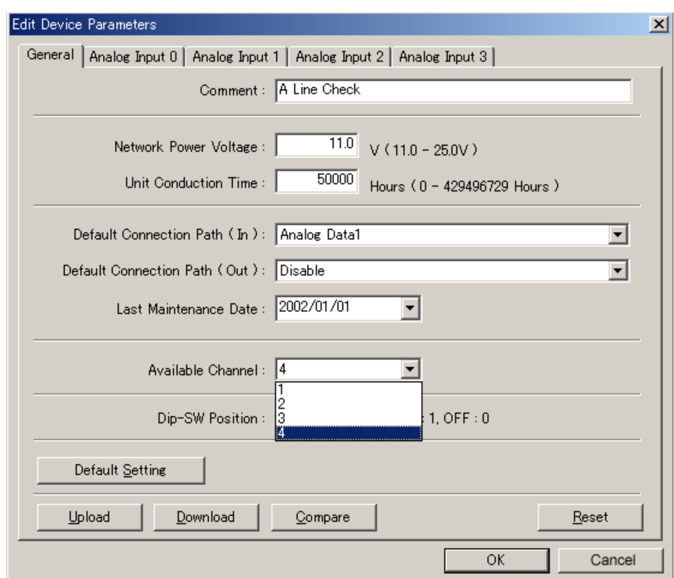
<table>
<tr><th>Conversion points</th><th>Details</th></tr>
<tr><td>4 points (default)</td><td>Converting Inputs 0 to 3.<br>
</td></tr>
<tr><td>3 points</td><td>Converting Inputs 0 to 2.<br>
</td></tr>
</table>

| Conversion points | Details |
|---|---|
| 2 points | Converting Inputs 0 and 1.   |
| 1 point | Converting Input 0 only.   |

**Setting Using the DeviceNet Configurator (DRT2-AD04 Only)**

***1,2,3...***

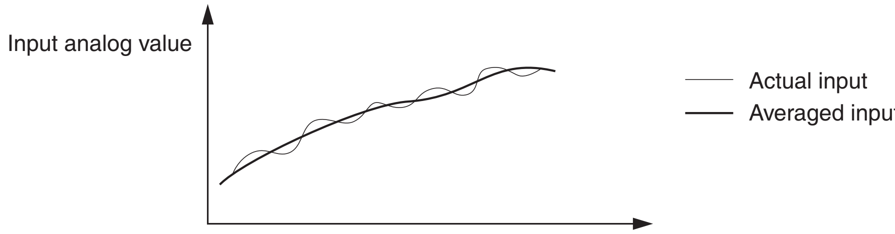
1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the **General** Tab and select the number of conversion points from the pull-down menu under the *Available Channel* field. In the following example, all four points are selected for conversion.




3. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the OK Button and exit the window.

## Moving Average Processing

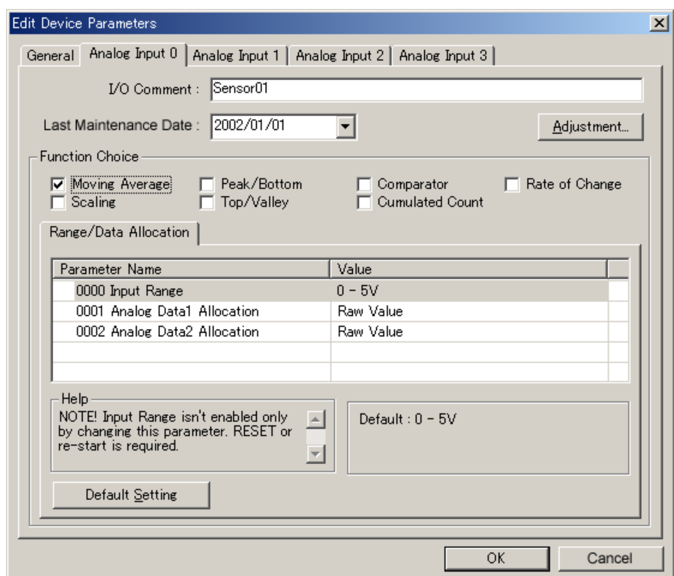
This function calculates the average value (moving average) of the previous eight inputs, and uses the resulting value as conversion data. When the input value fluctuates frequently, averaging can be used to produce a stable input value, as shown in the following diagram.




### Setting Using the DeviceNet Configurator

*1,2,3...*

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where moving average processing is to be performed, and select ***Moving Average*** under the *Function Choice* heading.




3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## Scaling

The default setting is used to perform AD conversion of analog input values, scaling them to a count between 0 and 6,000 (0 to 30,000 in the DRT2-AD04H). Scaling can be used to change scaled values that correspond to the input signal range into other values required by the user (industry unit values). Scaling also eliminates the need for ladder programming in the Master to perform math operations. The following two methods of input scaling can be used.

**Default Scaling**

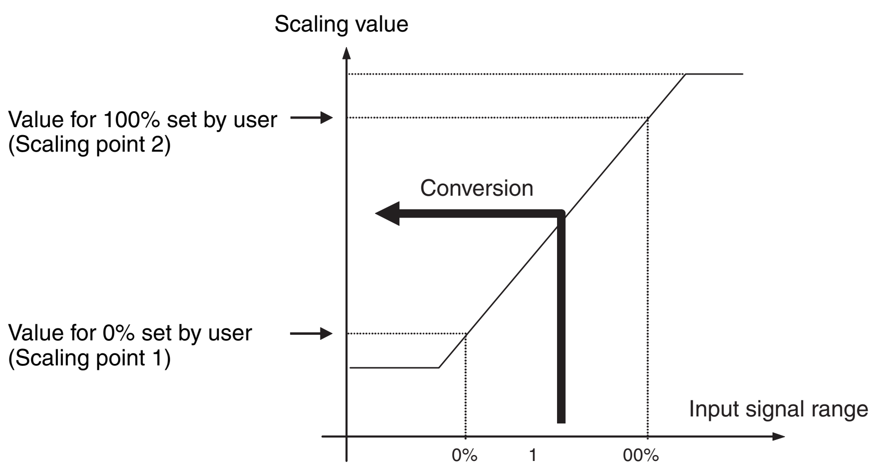
Analog input values (count values) are converted to the original voltage and current values. The units used are mV or µA. When default scaling is selected, scaling is performed according to the range used, as shown in the following table.

| Input range | 0 to 5 V | 0 to 10 V | 1 to 5 V | –10 to 10 V (AD04 only) | 0 to 20 mA | 4 to 20 mA |
|---|---|---|---|---|---|---|
| 100% | 5,000 mV | 10,000 mV | 5,000 mV | 10,000 mV | 20,000 µA | 20,000 µA |
| 0% | 0000 mV | 0000 mV | 1,000 mV | –10,000 mV | 0000 µA | 4,000 µA |
| Off-wire | --- | --- | 7FFF hex | --- | --- | 7FFF hex |

**User Scaling**

Analog input values (count values) are scaled to user-defined values. The conversion values for 100% and 0% are set using the Configurator.

| Input range | 0 to 5 V | 0 to 10 V | 1 to 5 V | –10 to 10 V (AD04 only) | 0 to 20 mA | 4 to 20 mA |
|---|---|---|---|---|---|---|
| 100% | Set using Configurator (–28,000 to 28,000) | | | | | |
| 0% | Set using Configurator (–28,000 to 28,000) | | | | | |
| Off-wire | --- | --- | 7FFF hex | --- | --- | 7FFF hex |

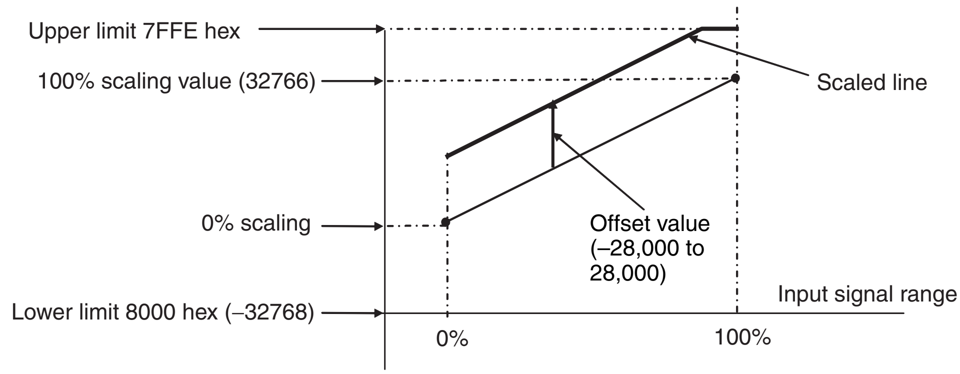



**Note** Reverse scaling, where the 0% scaling value is higher than the 100% scaling value, is also supported.

**Offset Compensation**

Scaling analog input values of linear sensors to distances produces mounting error in the sensor. Offset compensation compensates for error that occurs during scaling. The offset amount is added to the scaled line before processing, as shown in the following diagram. The offset (error) value can be input between –28,000 to 28,000, but make sure that underflow or overflow does not occur. The High Limit is 7FFE hex and the Low Limit is 8000 hex.

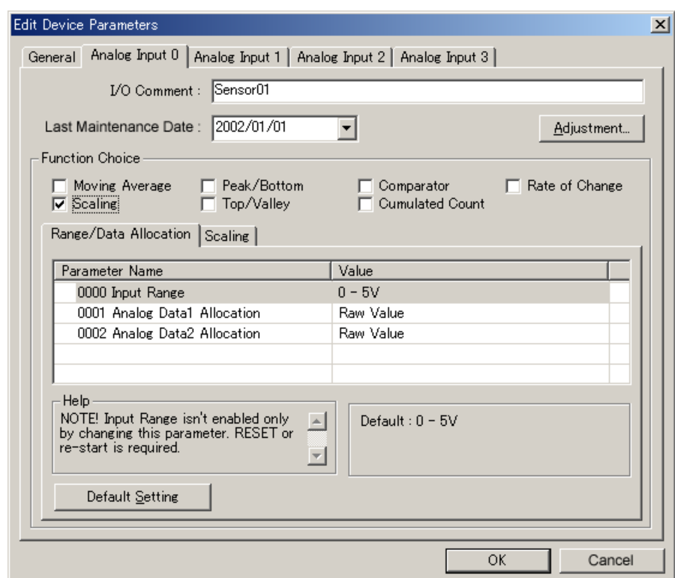
**Note** The offset value can be set even when using default scaling.



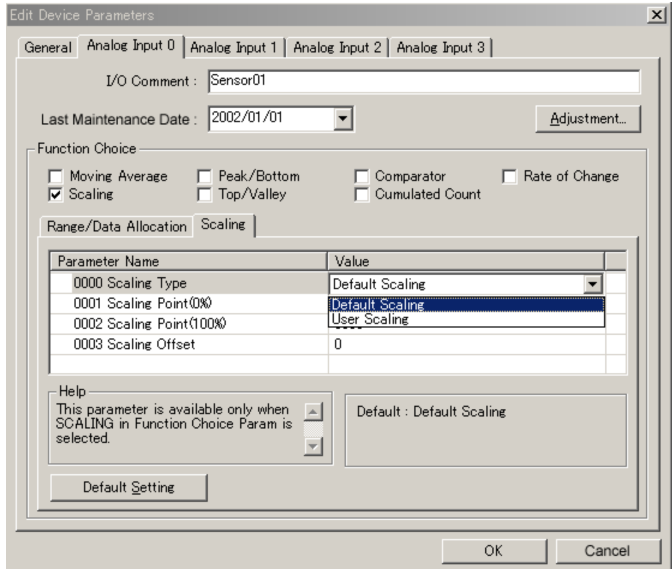

### Setting Using the DeviceNet Configurator

***1,2,3...***

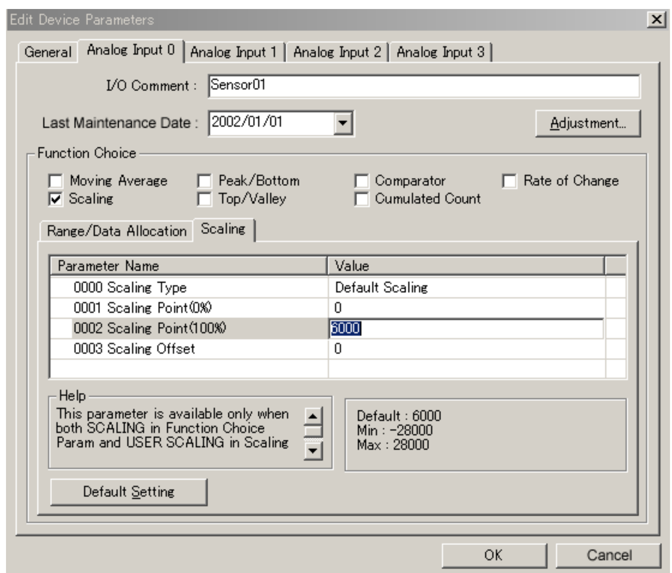
1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where scaling is to be performed, and select ***Scaling*** under the *Function Choice* heading.



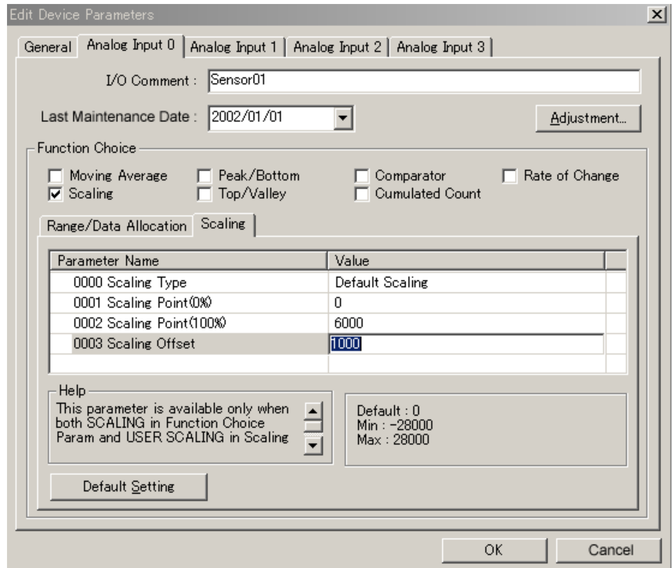
3. Click the **Scaling** Tab, and select either ***Default Scaling*** *or* ***User Scaling***.




4. For user scaling, set the 0% value in the *Scaling point 1* field, and set the 100% value in the *Scaling point 2* field.



5. For offset compensation, set the offset value in the *Scaling Offset* field. Also select either ***Default Scaling*** or ***User Scaling*** in the *Scaling Type* field.

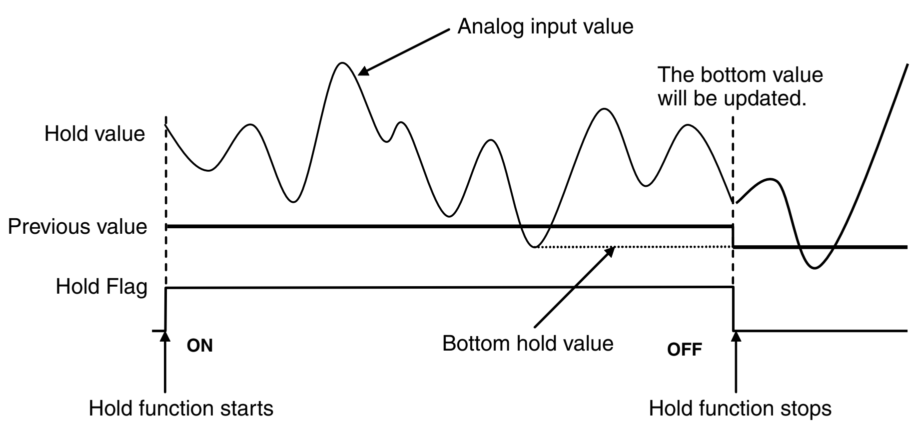



6. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
7. Click the **OK** Button and exit the window.

## Peak/Bottom Hold

Peak/bottom hold is used to hold the maximum (peak) value or minimum (bottom) value of the analog input value. When the Hold Flag (output) allocated in the OUT Area turns ON, the hold function starts, searching for the peak or bottom value until the Hold Flag turns OFF. (The peak/bottom value is refreshed when the Hold Flag turns OFF.) The comparator function can be used to compare the peak or bottom values allocated as analog data. (Refer to details on the comparator function.)

### ■ Example of Bottom Hold

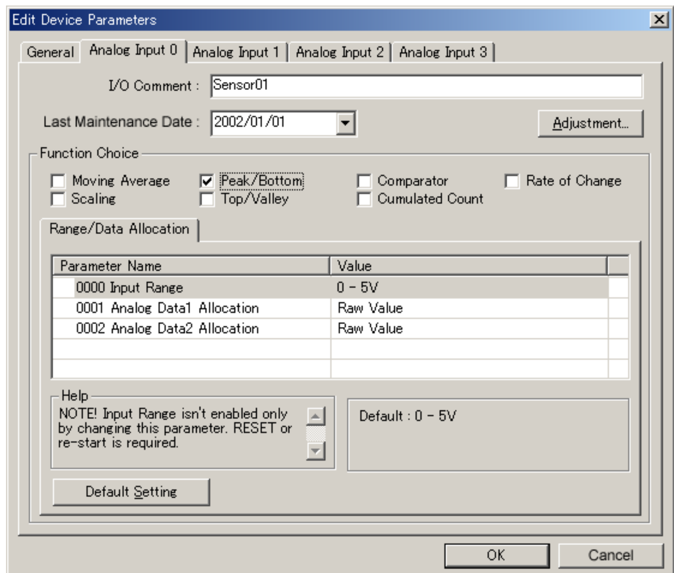



**Note** A delay in network transmission time will occur from the time the Hold Flag turns ON (or OFF) in the Master's ladder program until notification of the flag's status is actually sent to the Slave. Therefore, even when the Hold Flag is ON, the first analog data transmitted to the Master when the CPU Unit power is turned ON may be the data from when the Hold Flag was OFF. To collect peak/bottom hold data using the Hold Flag at the Master, configure a ladder program that considers the transmission delay when the Hold Flag is turned ON, then enables the peak/bottom hold values after a fixed time interval.

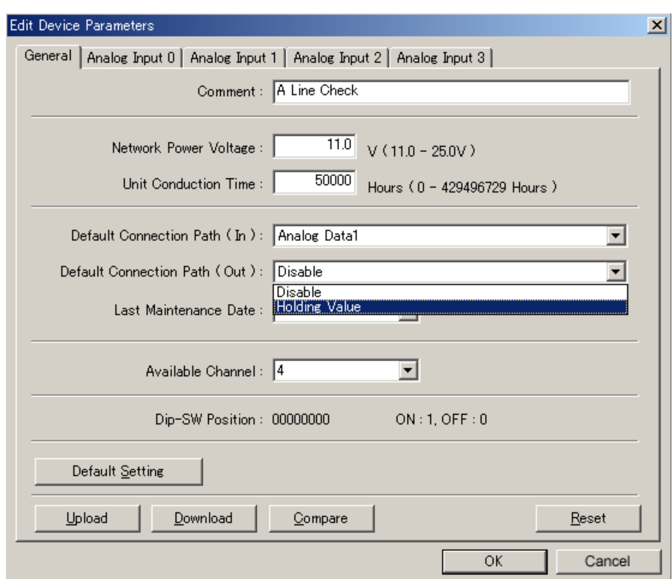
### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where peak/bottom hold is to be set, and select ***Peak/Bottom Hold*** under the *Function Choice* heading.




3. To allocate the Hold Flags (output) in the default connection path, click the **General** Tab and select ***Holding Value*** from the pull-down menu in the *Default Connection Path (Out)* field.




4. Click the **Download** Button and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

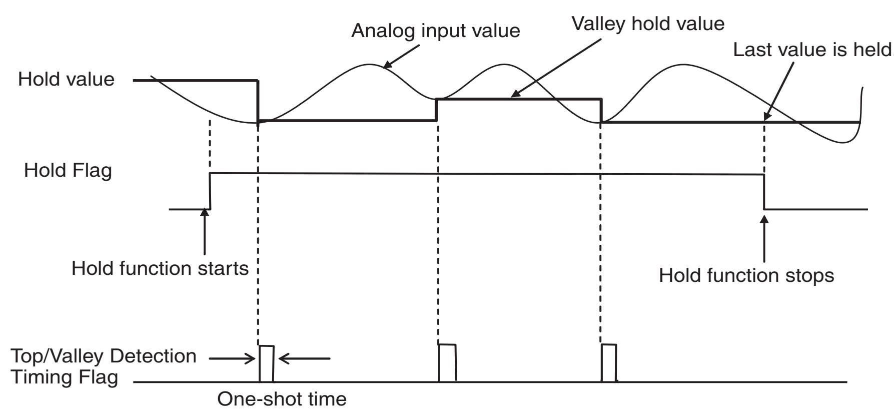
## Top/Valley Hold

Top/valley hold is used to hold the top and valley values of the analog input value.

Analog values that fluctuate more than twice the hysteresis value are monitored, and the top or valley values are held. The top or valley value is allocated along with the Top/Valley Detection Timing Flags, which can be used to check the hold timing.

When the Hold Flag (output) allocated in the OUT Area turns ON, the hold function starts, refreshing the top or valley value until the Hold Flag turns OFF. (The last value is held when the Hold Flag turns OFF, but the next time the Hold Flag turns ON, the hold value is initialized as soon as a top or valley occurs.) The comparator can be used to compare the top or valley value allocated as analog data. (Refer to details on the comparator function.)

### ■ Example of Valley Hold




**Note**

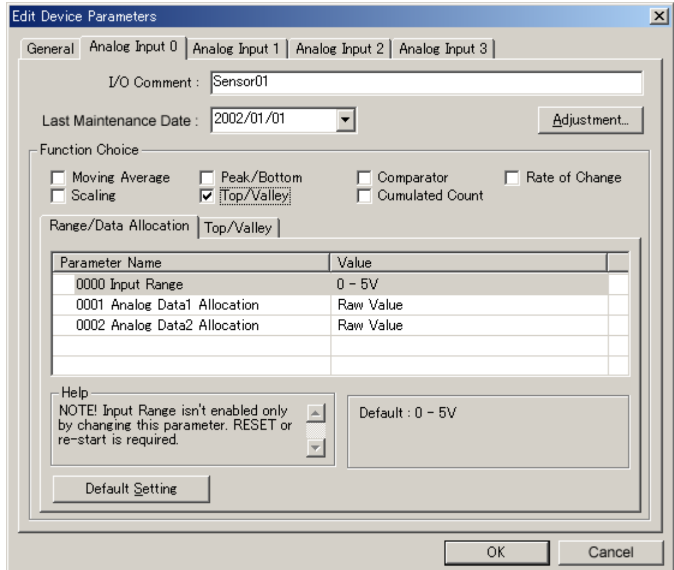
1. A delay in network transmission time will occur from the time the Hold Flag turns ON (or OFF) in the Master's ladder program until notification of the flag's status is actually sent to the Slave. Therefore, even when the Hold Flag is ON, the first analog data transmitted to the Master when the CPU Unit power is turned ON may be the data from when the Hold Flag was OFF. To collect top/valley hold data using the Hold Flag at the Master, configure a ladder program which considers the transmission delay time when the Hold Flag is turned ON, then enables the top/valley hold values after a fixed time interval.
2. The time that the Top/Valley Detection Timing Flags are ON can be adjusted by setting the one-shot time. Use the Configurator to set the one-shot time (the setting range is 1 to 65535 ms).
3. If the Hold Flag turns OFF during the time the Top/Valley Detection Timing Flag is set to be ON, both flags will turn OFF simultaneously.

### Setting Using the DeviceNet Configurator

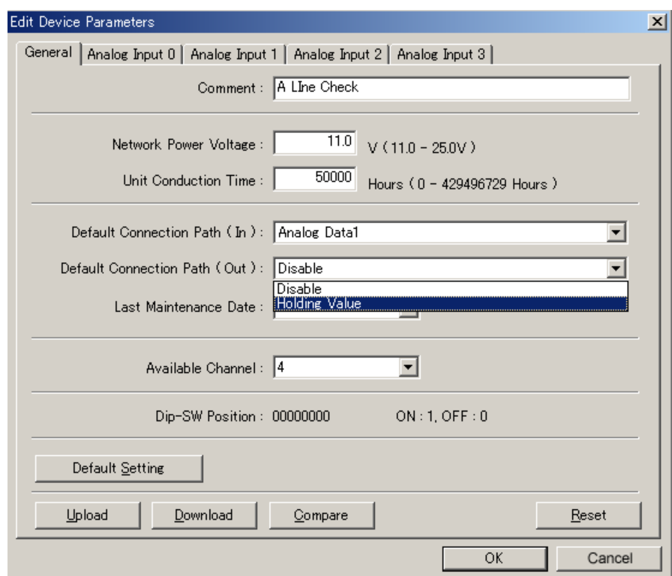
***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Select the Tab Page for the input where top/valley hold is to be set, and select ***Top/Valley Hold*** under the *Function Choice* heading.




3. To allocate the Hold Flag (output) in the default connection path, click the **General** Tab, and select ***Holding Value*** from the pull-down menu in the *Default Connection Path (Out)* field.

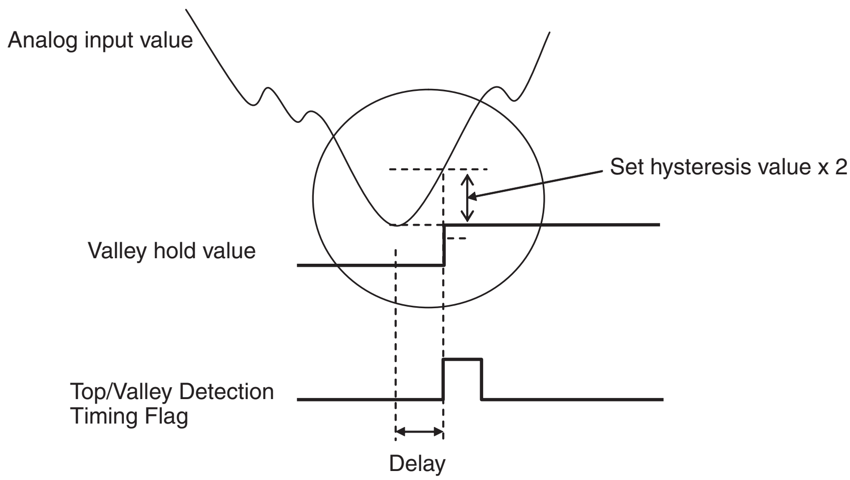



4. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.

**Hysteresis Setting**

The hysteresis value can be set using the Configurator to prevent detection of top or valley values that occur due to minor fluctuations in the analog input value. This will cause the start of data holding to be delayed after the actual top or valley value occurs, as shown in the following diagram.

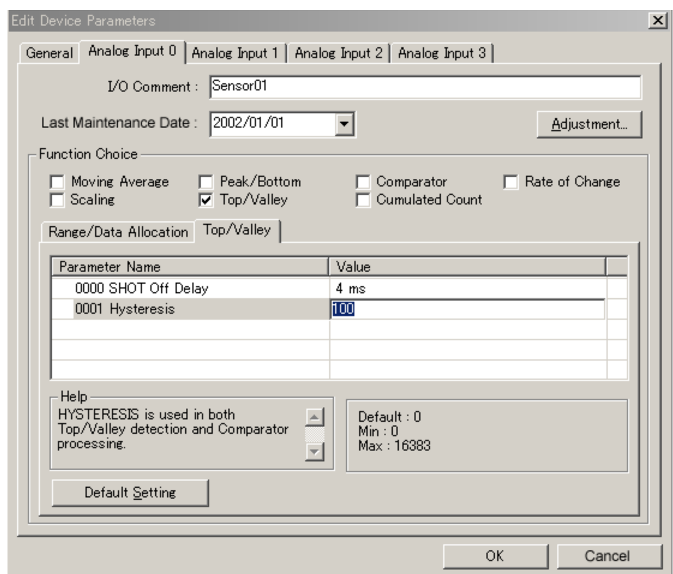
### ■ Timing for Setting Data




### ■ Setting Hysteresis Using the DeviceNet Configurator

***1,2,3...***

1. Input the value for hysteresis in the *Hysteresis* field in the **Top/Valley** Tab under the *Function Choice* heading.



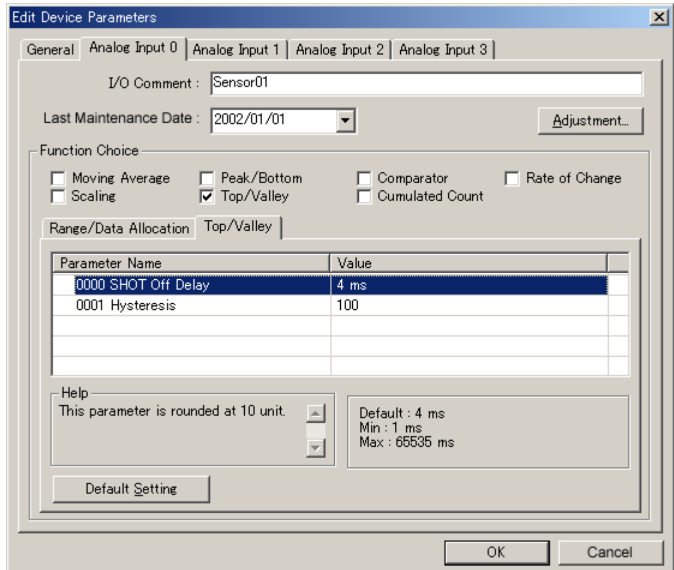

2. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
3. Click the **OK** Button and exit the window.

**Note** The hysteresis value set for the top/valley hold function is also used by the comparator function.

### One-shot Time Setting

***1,2,3...***

1. Input the desired value in the *SHOT Off Delay* field of the **Top/Valley** Tab under the *Function Choice* heading.

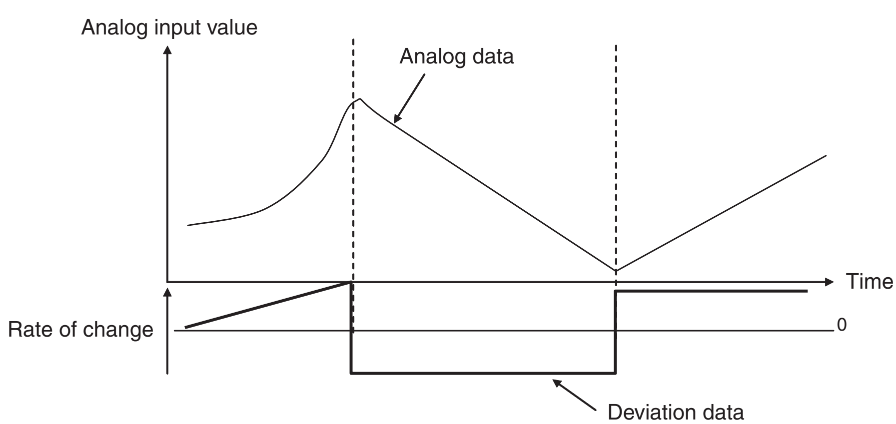



2. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
3. Click the **OK** Button and exit the window.

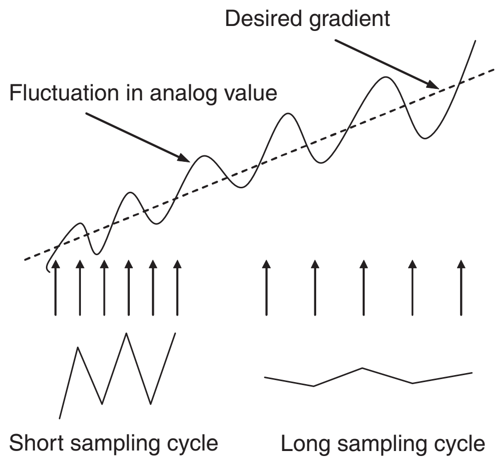
## Rate of Change Calculation

The rate of change can be obtained for each sampling cycle set for the analog input data. This function calculates the difference between each set sampling cycle and value obtained in the previous cycle. The default setting for the sampling cycle is 100 ms and the sampling cycle setting range depends on the model, as shown in the following table.

| Model | Sampling cycle setting range |
|---|---|
| DRT2-AD04 | 10 to 65,530 ms (Set in 10-ms units.) |
| DRT2-AD04H | 250 to 65,500 ms (Set in 250-ms units.) |



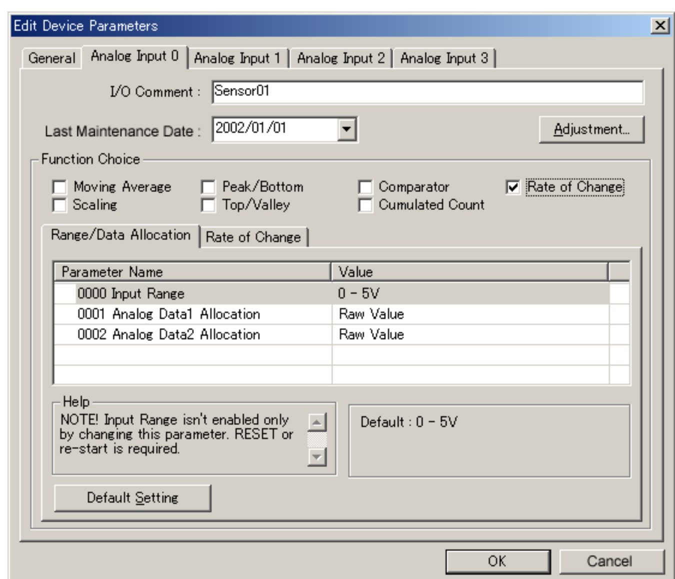

**Note** If the sampling cycle is set to a small value, the rate of change will be sensitive to small changes. If the analog data is subject to minute fluctuations, and the sampling cycle is shorter than the cycle of fluctuation, the fluctuation will be regarded as the rate of change. To prevent this occurring, use moving average processing, which will set a longer sampling cycle.



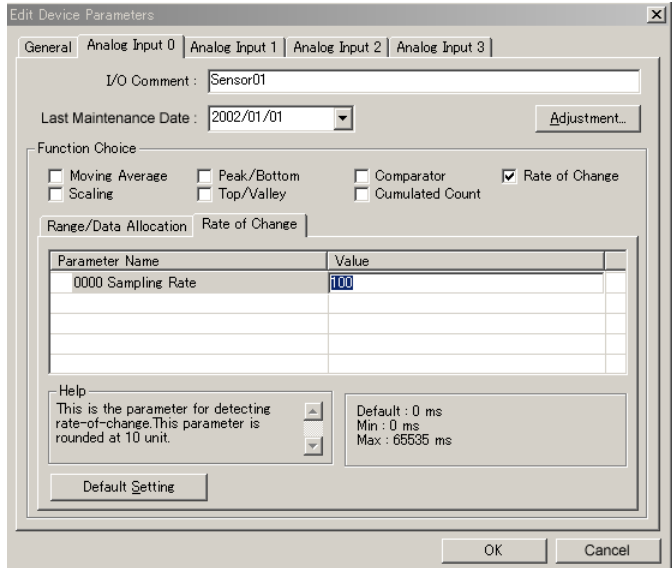

### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where rate of change is to be set, and select ***Rate of Change*** under the *Function Choice* heading.



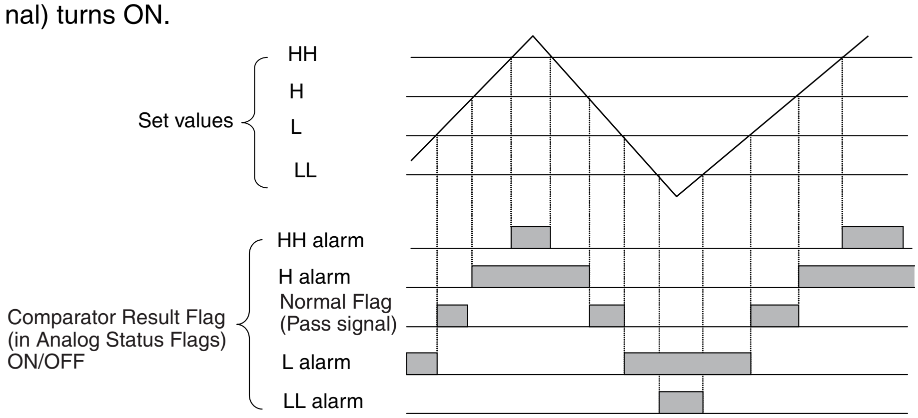
3. To set the sampling cycle, click the **Rate of Change** Tab and input the desired value for the sampling cycle in the *Sampling Rate* field.




4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

## Comparator

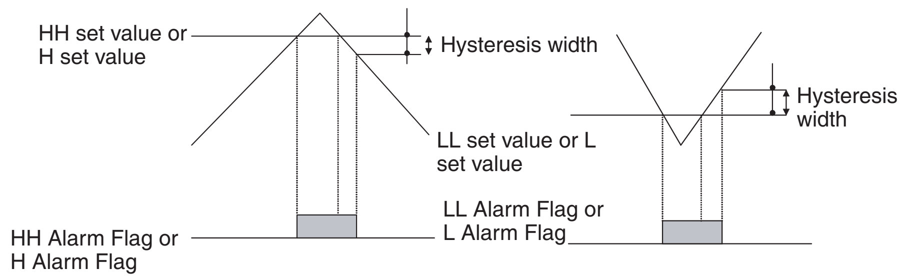
When the High High Limit, High Limit, Low Low Limit, and Low Limit are set in the Slave, a flag will turn ON when a value exceeds the setting range. The four set values are High High Limit (HH), High Limit (H), Low Low Limit (LL), and Low Limit (L), and the values are compared with those in Analog Data 1. (The comparator function cannot be used with Analog Data 2.) When each of these values is exceeded, the Comparator Result Flag in the area for Analog Status Flags turns ON. If an alarm does not occur, the Normal Flag (pass signal) turns ON.




**Note** When the analog input value changes faster than the conversion cycle, the High Limit alarm may turn ON without the Normal Flag (pass signal) turning ON for the Low Limit alarm. Configure ladder programs to prevent this occurring.

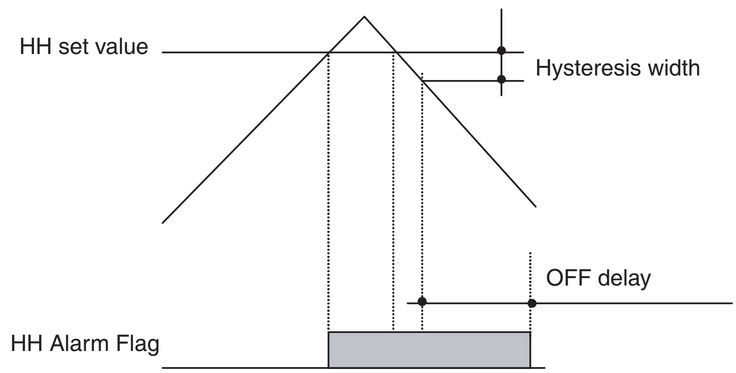
**Setting Hysteresis**

The Comparator Result Flag turns OFF when the value is lower than the hysteresis width (H or HH alarm occurs) or exceeds it (L or LL alarm occurs), as shown in the following diagram. If the analog value fluctuates around the threshold, and the flag repeatedly turns ON or OFF, setting hysteresis will stabilize the flag operation.




**OFF Delay**

The time until the Comparator Result Flag turns OFF can be extended. For example, even if the Flag is ON momentarily, the OFF delay can be set so that the Master can receive notification of the Flag's status.

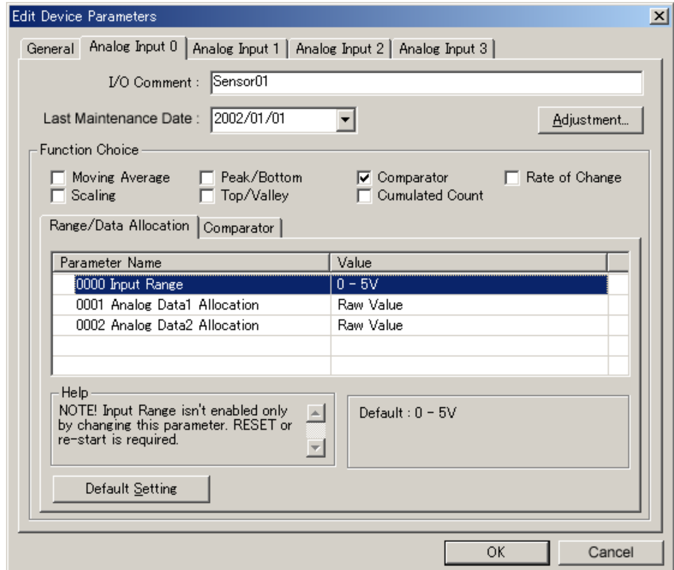



**Setting Using the DeviceNet Configurator**

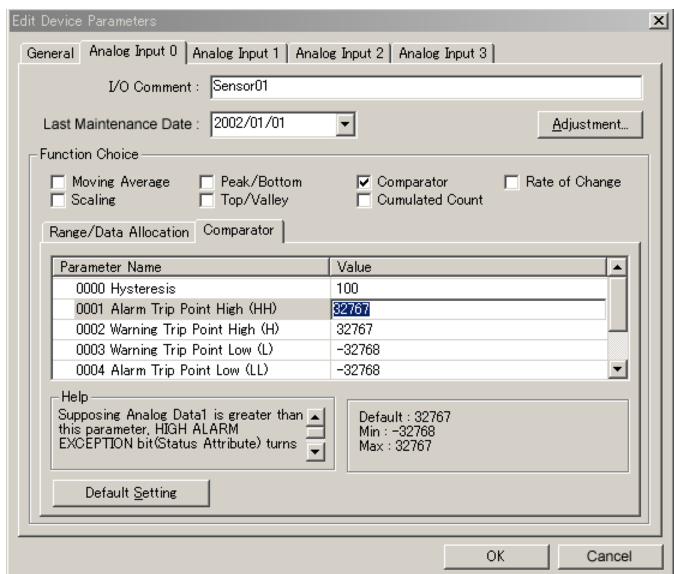
***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

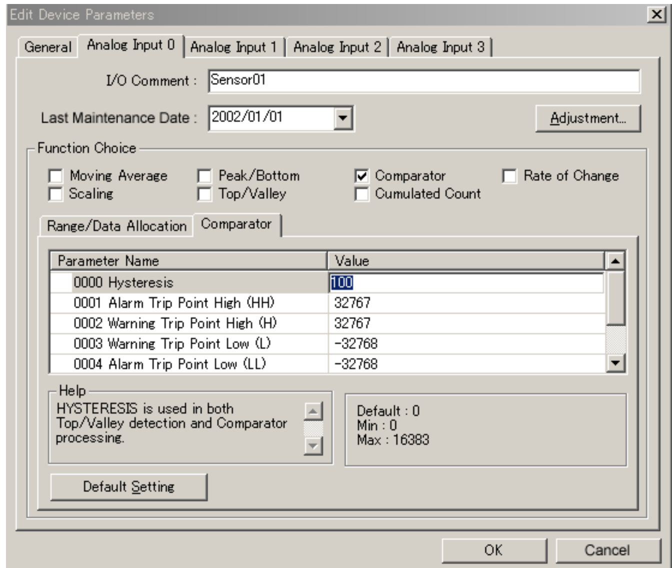
2. Select the Tab Page for the input where the comparator function is to be set, and select ***Comparator*** under the *Function Choice* heading.




3. Click the **Comparator** Tab and set each of the alarm values. The example here shows the setting for *Alarm Trip Point High* (HH limit set value).

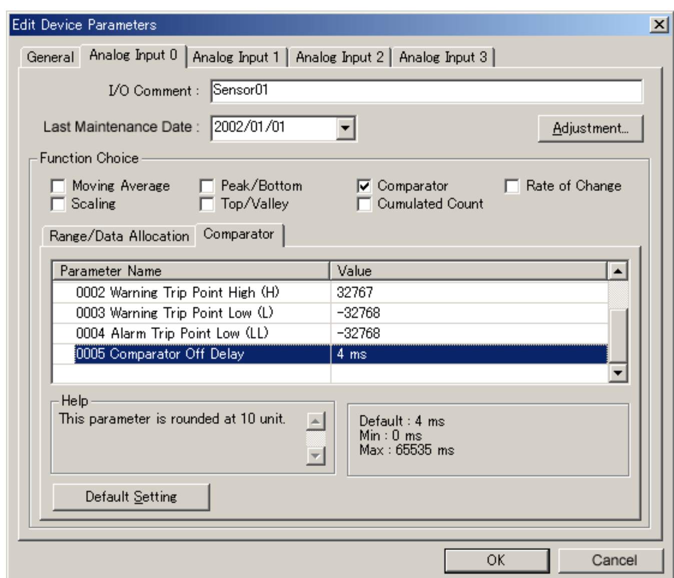


4. To set the hysteresis value, input the desired value in the *Hysteresis* field.




**Note** The hysteresis value set for the comparator function is also used by the top/valley hold function.

5. To set the OFF delay function, input the desired value in the *Comparator Off Delay* field.




6. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
7. Click the **OK** Button and exit the window.

## Off-wire Detection

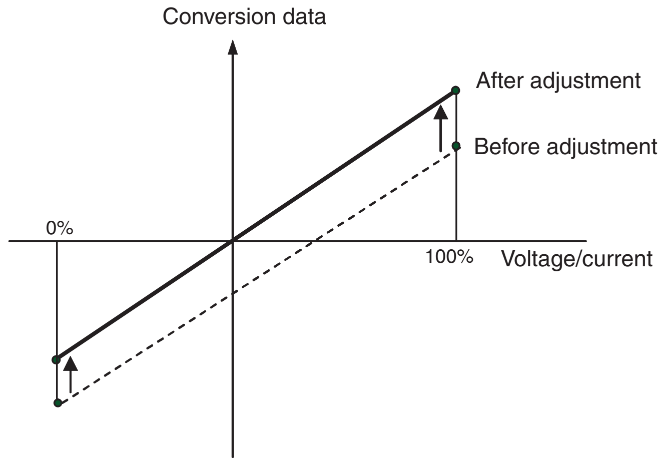
When a disconnection occurs in an analog input line (voltage input or current input), the Off-wire Detection Flag turns ON for each input that is enabled in the number of AD conversion points. The Off-wire Detection Flags are included in the Analog Status Flags.

When Off-wire Detection is enabled, the value of AD conversion data is set to 7FFF hex. When the input returns to a value within the range that can be converted, the Off-wire Detection function will automatically be turned OFF, and normal data conversion will occur.

Off-wire Detection functions with input ranges of 1 to 5 V or 4 to 20 mA only. With the 1 to 5 V input range, an off-wire condition is detected when the input voltage is below 0.76 V (less than 6%). With the 4 to 20 mA input range, an off-wire condition is detected when the input current is below 3.04 mA.

## User Adjustment

Depending on factors such as the characteristics and connection methods of the input device, the input can be adjusted to compensate for error in the input voltage or current. The following diagram shows when compensation is applied to the conversion line at the two points for 0% and 100%.




The following table shows the input ranges that support user adjustment.

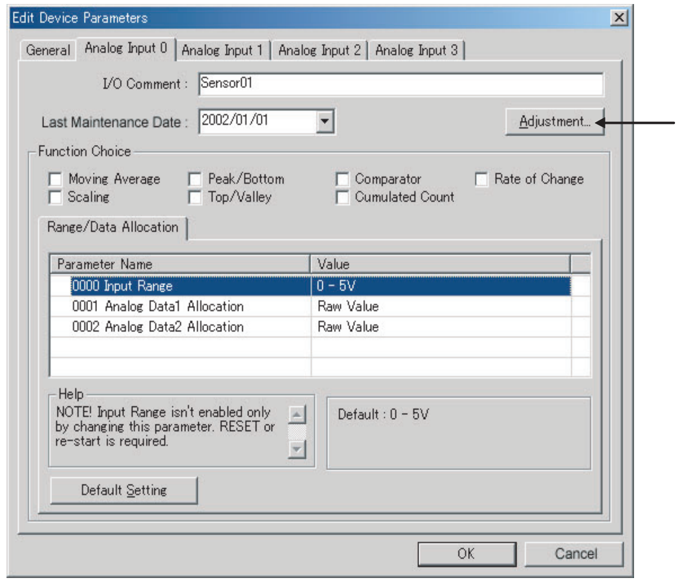
| Input range | Low Limit | High Limit |
|---|---|---|
| 0 to 5 V | –0.25 to 0.25 V | 4.75 to 5.25 V |
| 1 to 5 V | 0.8 to 1.2 V | 4.8 to 5.2 V |
| 0 to 10 V | –0.5 to 0.5 V | 9.5 to 10.5 V |
| –10 to 10 V | –11 to –9.0 V | 9.0 to 11 V |
| 4 to 20 mA | 3.2 to 4.8 mA | 19.2 to 20.8 mA |
| 0 to 20 mA | –1.0 to 1.0 mA | 19 to 21 mA |

### Setting Using the DeviceNet Configurator

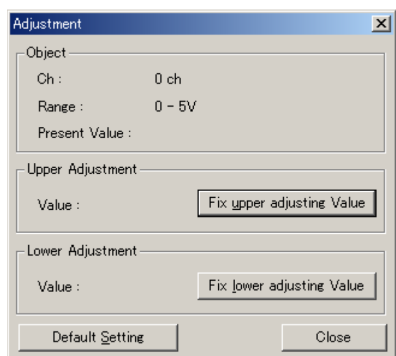
***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

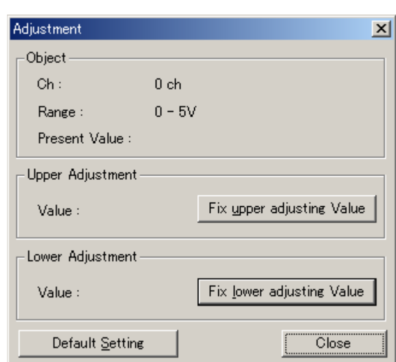
2. Select the Tab Page for the input to be adjusted, and click the **Adjustment** Button. (At the same time set the input range again.)




3. Input the voltage (or current) transmitted from the connected device to the Unit's input terminal that is equivalent to the 100% value.
4. Click the **Fix upper adjusting value** Button, and input the adjusted value.




5. Input the voltage (or current) transmitted from the connected device to the Unit's input terminal that is equivalent to the 0% value.
6. Click the **Fix lower adjusting value** Button, and input the adjusted value.



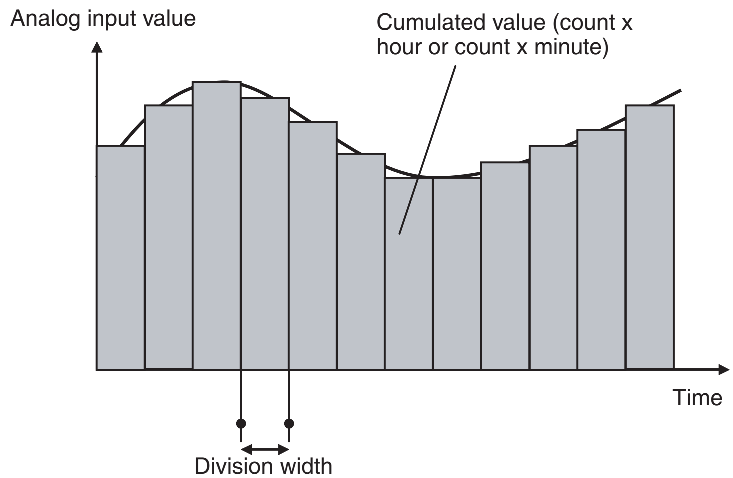

7. To return an adjusted value to the default setting, click the **Default Setting** Button.
8. Close the Adjustment Window, return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.

9. Click the **OK** Button and exit the window.

## Cumulative Counter

The cumulative counter calculates an approximation to the integral of analog input values over time. The cumulated value can be calculated in “count hours” (by selecting “hours”) or “count minutes” (by selecting “minutes”). The count value is the analog input value in the industry unit obtained after scaling. For example, 100.0 count hours indicates a value equivalent to an analog input value of 100 counts continuing for one hour. The counter range for a four-byte area (two words) for count hours or count minutes is –214,748,364.8 to +214,748,364.7. Data is displayed on the Configurator in units of 0.1 hour or minute.

Monitor values can also be set in the Unit. When the cumulated count value exceeds the set monitor value, the Cumulative Counter Flag in the area for Generic Status Flags turns ON.




**Note** The following table shows the divisions for the cumulative counter.

**DRT2-AD04**

| Unit | Divisions |
|---|---|
| Hour | 3.6 s (1/1,000 hour) |
| Minute | 60 ms (1/1,000 minute) |

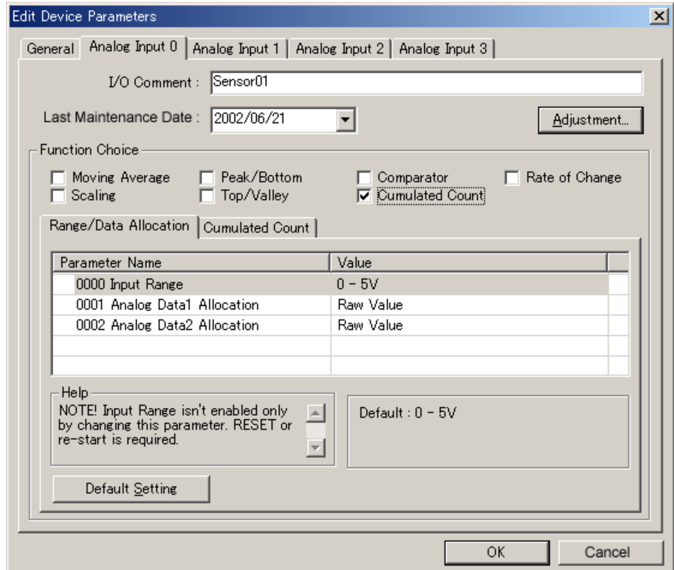
**DRT2-AD04H**

| Unit | Divisions |
|---|---|
| Hour | 15 s (1/240 hour) |
| Minute | 250 ms (1/240 minute) |

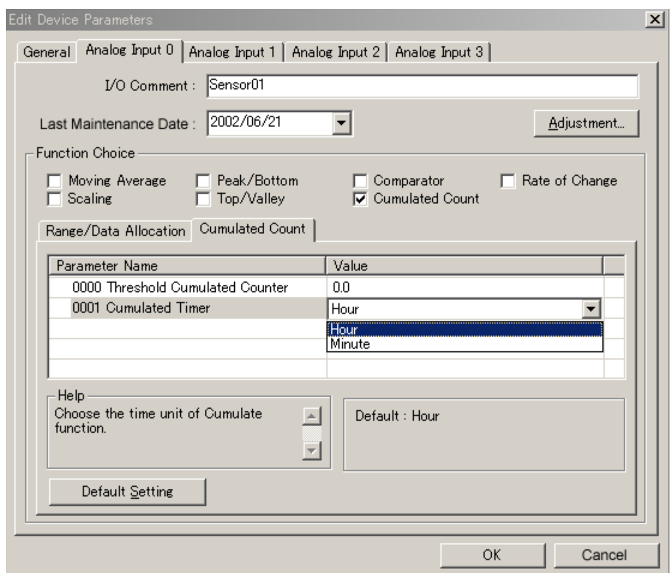
### Setting Using the DeviceNet Configurator

*1,2,3...* 1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

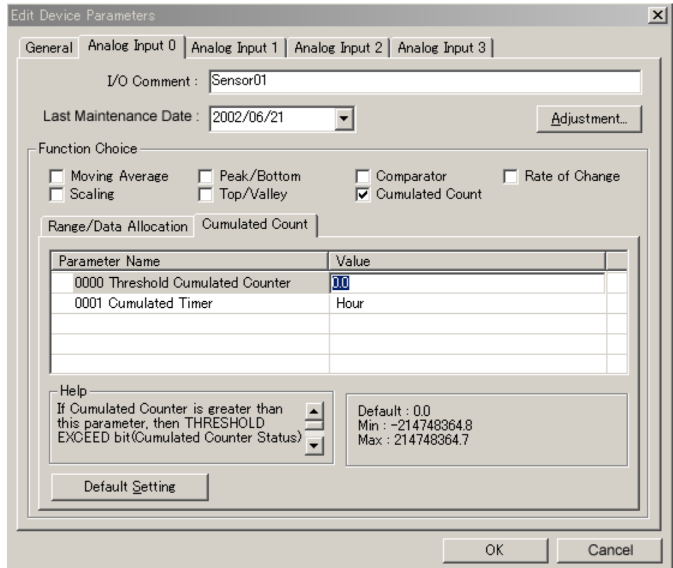
2. Select the Tab Page for the input where the cumulative counter is to be set, and select ***Cumulated Count*** under the *Function Choice* heading.




3. To set the counter unit, click the **Cumulated Count** Tab and select ***Hour*** or ***Minute*** from the pull-down menu in the *Cumulated Timer* field.



4. To set the monitor value, click the **Cumulated Count** Tab, and input the desired value in the *Threshold Cumulated Counter* field.




5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

## Last Maintenance Date

The last maintenance date can be set in the Unit separately for the Unit and the connected devices. It enables the user to easily determine the next maintenance date. The date can be set using the Configurator.

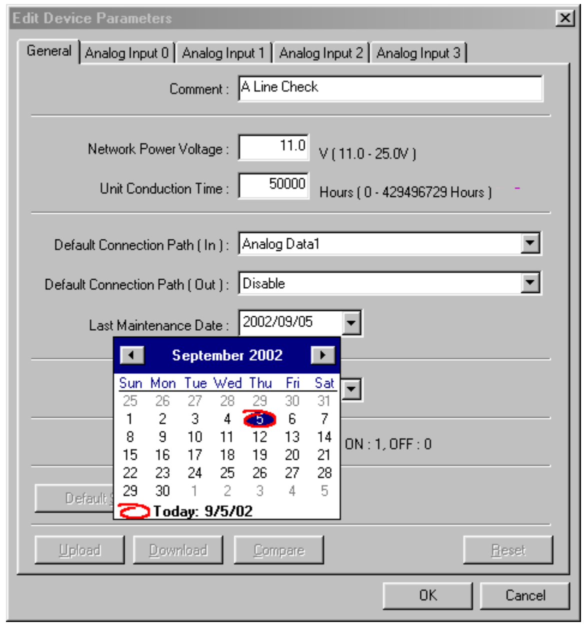
### Setting Using the DeviceNet Configurator

#### ■ Setting the Last Maintenance Date of the Unit

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Click the **General** Tab, and select the applicable date from the pull-down menu in the *Last Maintenance Date* field. (To enter the current date, select ***Today***, which is at the bottom of the pull-down menu.)



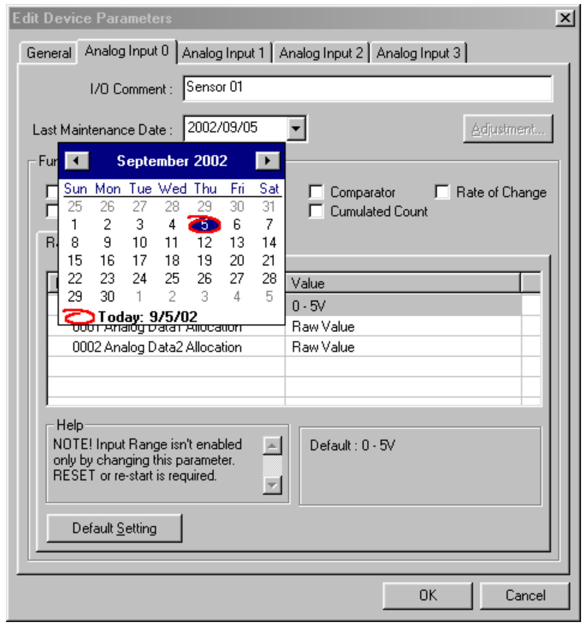

3. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## ■ Setting the Last Maintenance Date of the Connected Device

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the Tab Page for the input that is connected to a connecting device requiring the last maintenance date to be set. Select the applicable date

from the pull-down menu in the *Last Maintenance Date* field. (To enter the current date, select ***Today***, which is at the bottom of the pull-down menu.)




3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## 7-4-4 Calculating the Conversion Cycle (DRT2-AD04 Only)

The conversion cycle speed can be improved by setting the number of AD conversion points, but will vary with the use of the math operations. Use the following table and formula to calculate the conversion cycle time.

**Formula**

AD conversion cycle time = AD base conversion time $+\Sigma$ (Additional time for each function)

AD base conversion time: Cycle time when the math operation is not used at all. The value for each conversion point from 1 to 4 is different.

Extra time for each function: The additional time that is required when math operations are used.

The following table shows the AD base conversion times (unit: ms).

| Time | 1 point | 2 points | 3 points | 4 points |
|---|---|---|---|---|
| Max | 1.66 | 2.42 | 3.21 | 3.82 |
| Min | 0.68 | 0.81 | 1.47 | 2.03 |
| Average | 0.88 | 1.60 | 2.32 | 3.07 |

**Note** The DeviceNet communications cycle is 4 ms.

The following table shows the additional time required for each function (unit: ms).

| Math operation | Additional time for each point |
|---|---|
| Moving average | 0.045 |
| Scaling | 0.055 |
| Peak/bottom hold | 0.025 |
| Top/valley hold | 0.070 |
| Comparator | 0.065 |

| Math operation | Additional time for each point |
|---|---|
| Rate of change | 0.030 |
| Cumulative counter | 0.035 |

**Calculation Example**

When using three points, and applying scaling to the first and second inputs, and the cumulative counter to the third input, the maximum AD conversion cycle time can be obtained by using the following formula.

Formula: 3.21 + (0.055 x 2) + 0.035 = 3.355 ms

**Note** With the DRT2-DA04H, the conversion cycle time is within 250 ms even when all of the math operations are being used.

# 7-5 Analog Output Terminals

## 7-5-1 DRT2-DA02 Analog Output Terminal

### General Specifications

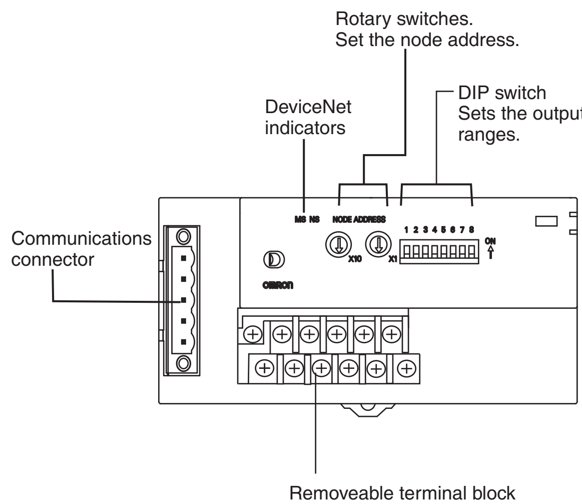
| Item | Specifications |
|---|---|
| Communications power supply voltage | 11 to 25 V DC (Supplied from the communications connector.) |
| Current consumption | 120 mA max. (24 V DC), 220 mA max. (11 V DC) |
| Noise immunity | Conforms to IEC61000-4-4. 2 kV (power lines) |
| Vibration resistance | 10 to 150 Hz, 0.7-mm double amplitude |
| Shock resistance | 150 $m/s^2$ |
| Dielectric strength | 500 V AC for 1 min. with 1-mA sensing current (between communications and analog circuits) |
| Ambient temperature | –10 to +55°C |
| Ambient humidity | 25% to 85% (with no condensation) |
| Operating environment | No corrosive gases |
| Storage temperature | –25 to +65°C |
| Mounting | 35-mm DIN Track mounting |
| Mounting strength | 50 N<br>In the direction of the Track: 10 N |
| Screw tightening torque | M3 (power supply, I/O terminals): 0.5 N·m |
| Weight | 150 g max. |

### Performance Specifications

| Item | | Specifications | |
|---|---|---|---|
| | | Voltage output | Current output |
| Output points | | 2 points (outputs 0 and 1) | |
| Output type | | 0 to 5 V<br>1 to 5 V<br>0 to 10 V<br>–10 to 10 V | 0 to 20 mA<br>4 to 20 mA |
| Output range setting method | | • DIP switch: Outputs 0 and 1 set separately.<br>• Configurator: Outputs 0 and 1 set separately. | |
| External output allowable load resistance | | 1 kΩ min. | 600 Ω max. |
| Resolution | | 1/6,000 (full scale) | |
| Overall accuracy | 25°C | ±0.4% FS | ±0.4% FS |
| | –10 to 55°C | ±0.8% FS | ±0.8% FS |
| Conversion time | | 2 ms/ 2 points | |

| Item | Specifications | |
|---|---|---|
| | Voltage output | Current output |
| DA conversion data | –10 to 10 V range: F448 to 0BB8 hex full scale (–3,000 to 3,000)<br>Other ranges: 0000 to 1770 hex full scale (0 to 6,000)<br>DA conversion range: ±5% FS of the above data ranges. | |
| Isolation method | Photocoupler isolation (between output and communications lines)<br>No isolation between output signal wires. | |
| I/O connection method | Terminal-block connection | |
| Standard accessories | None | |

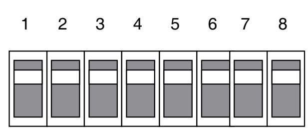
## Names and Functions of Parts




## Setting the Output Signal Range

### Setting with the DIP Switch

The output range can be set using the DIP switch or the Configurator.




Each pin is set according to the following table.

| Pin No. | Setting | Specifications |
|---|---|---|
| 1 | Sets output range for Output 0 | Default setting: All pins OFF |
| 2 | | |
| 3 | | |
| 4 | Sets output range for Output 1 | Default setting: All pins OFF |
| 5 | | |
| 6 | | |
| 7 | Sets DA conversion data format | ON: Signed binary<br>OFF: Two's complement |
| 8 | Range setting method | OFF: Use Configurator.<br>ON: Use DIP switch.<br>Default setting: OFF |

**Note**

1. Always set pin 8 to ON if the DIP switch is used to set the range. If this pin is OFF, the DIP switch settings will not be enabled.
2. The DIP switch settings are read when the power is turned ON.

### Output Range Settings

■ **Output 0**

| Signal range | Pin 1 | Pin 2 | Pin 3 |
|---|---|---|---|
| 0 to 5 V | OFF | OFF | OFF |
| 1 to 5 V | ON | OFF | OFF |
| 0 to 10 V | OFF | ON | OFF |
| –10 to 10 V | ON | ON | OFF |
| 4 to 20 mA | OFF | OFF | ON |
| 0 to 20 mA | ON | OFF | ON |

■ **Output 1**

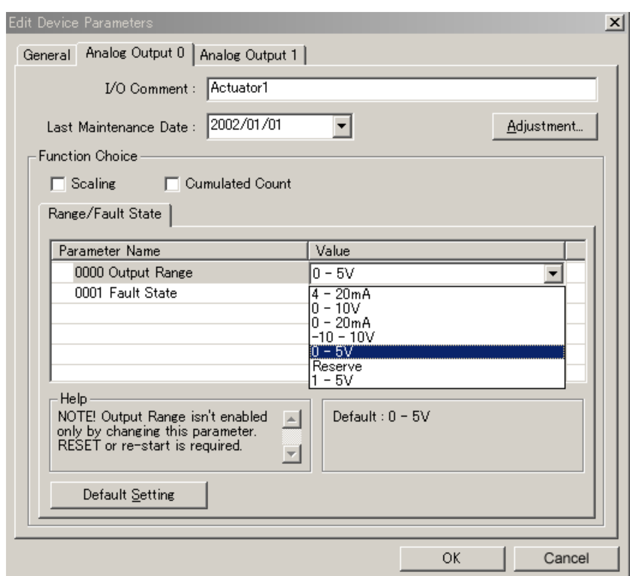
| Signal range | Pin 4 | Pin 5 | Pin 6 |
|---|---|---|---|
| 0 to 5 V | OFF | OFF | OFF |
| 1 to 5 V | ON | OFF | OFF |
| 0 to 10 V | OFF | ON | OFF |
| –10 to 10 V | ON | ON | OFF |
| 4 to 20 mA | OFF | OFF | ON |
| 0 to 20 mA | ON | OFF | ON |

### Setting Using the DeviceNet Configurator

Use the following procedure to set the output range for each output using the Configurator.

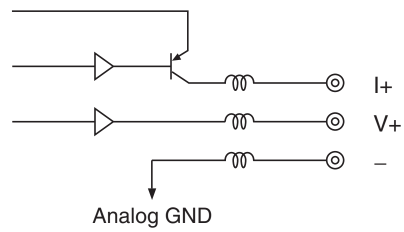
***1,2,3...***

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the output where the range is to be changed.
3. Click the *Output Range* field, and select the desired range.



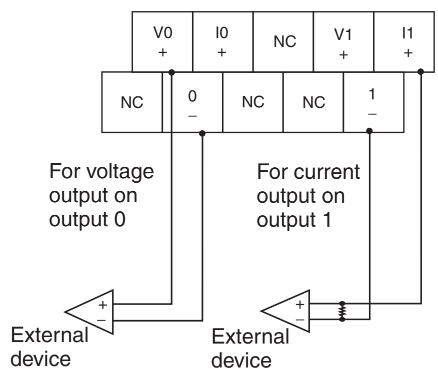

4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

## Internal Circuits




## Wiring

The terminal wiring varies according to whether voltage or current output is used.



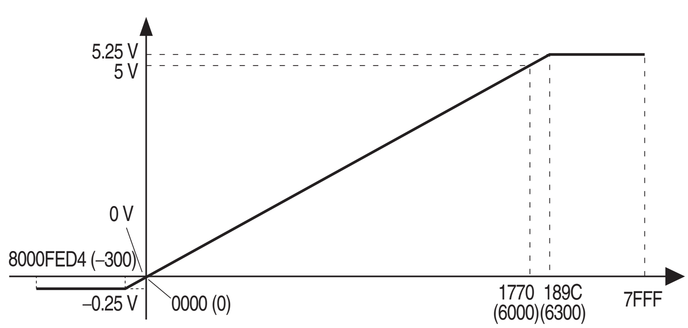

**Note:** The voltage or current output signal ranges are set on the DIP switch or from the Configurator.

## Output Range and Conversion Data

The digital values that are output are converted to analog data according to the output range used, as shown below. When the value exceeds the output range, the DA conversion data is fixed at the High Limit or Low Limit set value.

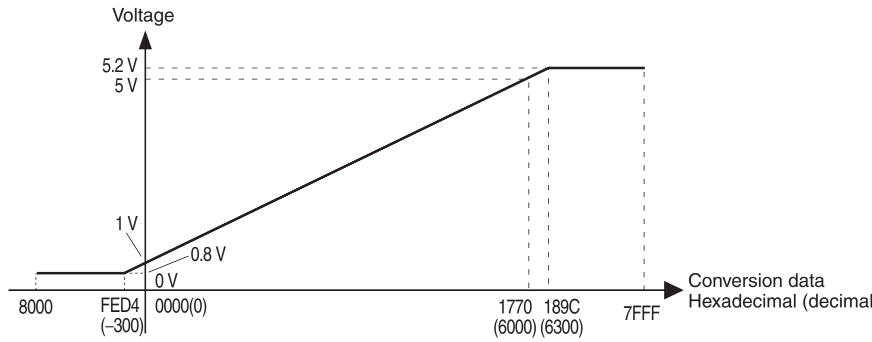
**Output Range: 0 to 5 V**

The values 0000 to 1770 hex (0 to 6,000) correspond to the voltage range 0 to 5 V. The output range is –0.25 to 5.25 V.



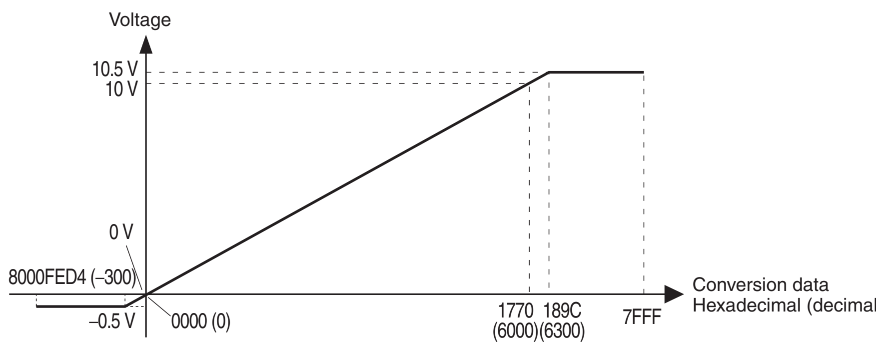
**Output Range: 1 to 5 V**

The values 0000 to 1770 hex (0 to 6,000) correspond to the voltage range 1 to 5 V. The output range is 0.8 to 5.2 V.



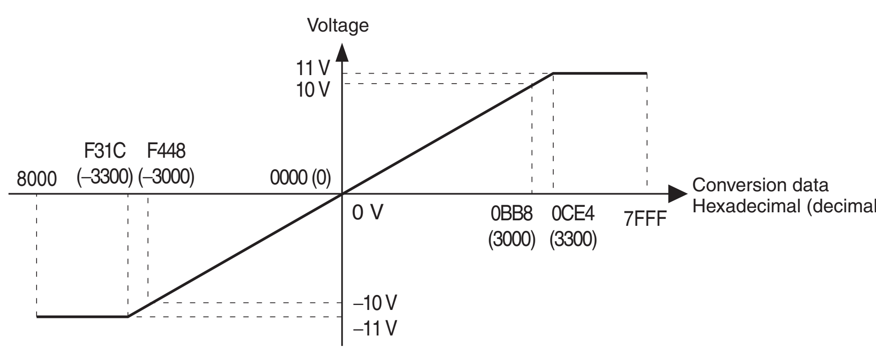

**Output Range: 0 to 10 V**

The values 0000 to 1770 hex (0 to 6,000) correspond to the voltage range 0 to 10 V. The output range is –0.5 to 10.5 V.



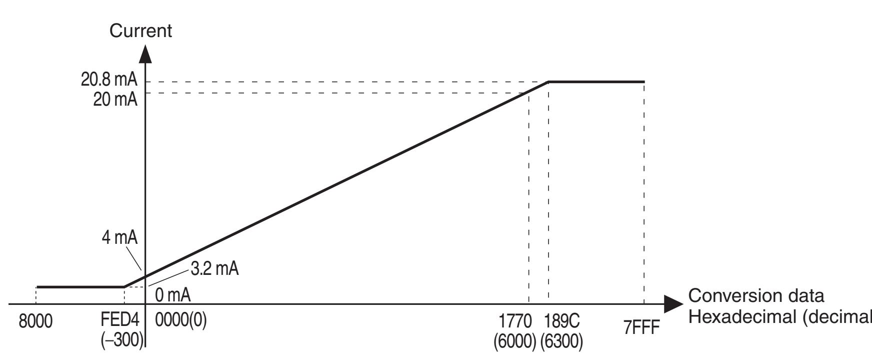

**Output Range: –10 to 10 V**

The values F448 to 0BB8 hex (–3,000 to 3,000) correspond to the voltage range –10 to 10 V. The output range is –11 to 11 V. Negative voltages are specified as two’s complements (16 bits).



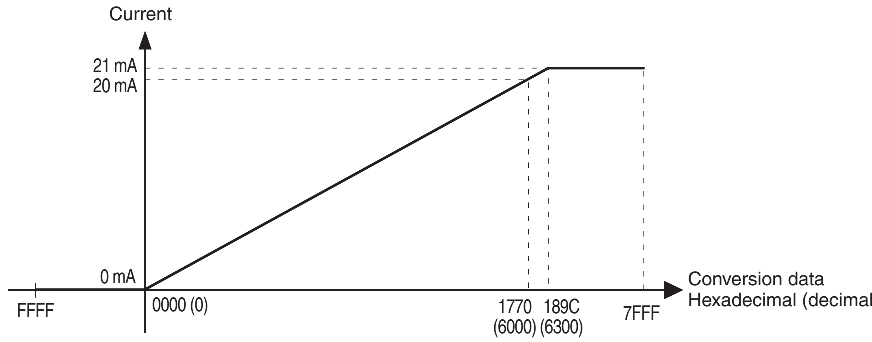

**Output Range: 4 to 20 mA**

The values 0000 to 1770 hex (0 to 6,000) correspond to the current range 4 to 20 mA. The output range is 3.2 to 20.8 mA.



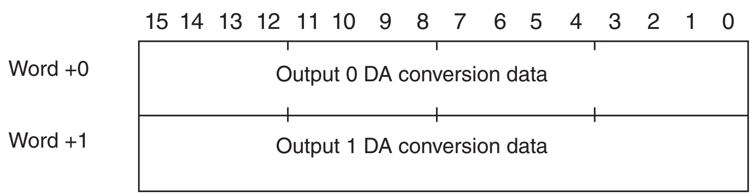
**Output Range: 0 to 20 mA**

The values 0000 to 1770 hex (0 to 6,000) correspond to the current range 0 to 20 mA. The output range is 0 to 21 mA.



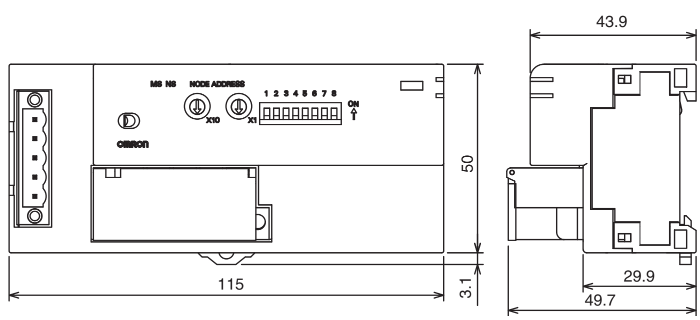

## DA Conversion Data

DA conversion data is output from the Master as shown in the following diagram.




When outputting negative voltages, specify the DA conversion data as two's complements. The NEG instruction can be used to obtain two's complements from absolute values. When pin 7 of the DIP Switch is turned ON, the DA conversion data will be expressed in signed binary.

## Dimensions




## 7-5-2 I/O Data Types and Allocation Methods

Analog Output Terminals support one type of output data and input data (Generic Status Flags) each. I/O can be allocated in the Master using one of the following three methods.

*1,2,3...*
1. Allocating only analog output values (default I/O data) in the Master.
2. Allocating selected I/O data.
3. Allocating user-defined I/O data.

## I/O Data Allocated in the Master

### ■ Allocating Only Analog Output Values (Default I/O Data)

When using the Analog Output Terminal's default settings, only the analog output values are allocated as I/O in the two words (four bytes) of the Master's OUT Area. The Configurator can also be used to allocate the I/O data in a user-defined address (user allocation).

| 15 8 | 7 0 |
|---|---|
| Analog output value for Output 0 | |
| Analog output value for Output 1 | |

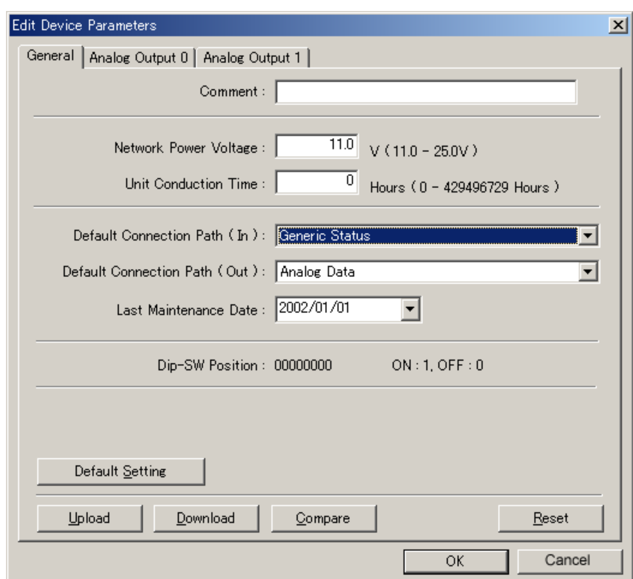
### ■ Allocating Selected I/O Data

Analog data that has been processed using math operations and Status Flags (input) can be allocated in the Master. The Configurator can be used to select the data from a pull-down menu, as shown in the following procedure.

**Setting Using the DeviceNet Configurator**

***1,2,3...***

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the **General** Tab, and select ***Analog Data*** from the pull-down menu in the *Default Connection Path (Out)* field. To allocate the Status Flags at the same time, select ***Generic Status*** from the pull-down menu in the *Default Connection Path (In)* field.




3. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

### ■ Allocating User-defined I/O Data

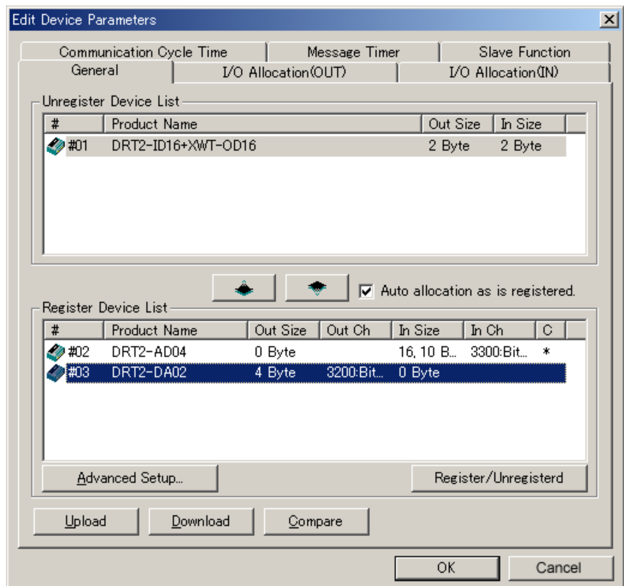
Analog data that has been processed using math operations and Status Flags can be selected and allocated as I/O in the Master in any combination. The Configurator can be used to allocate the I/O in the Master.
This method is supported by CS/CJ-series DeviceNet Master Units only.

**Note** The settings in the Master are given priority, so the default connection path settings in the Slaves are not required.

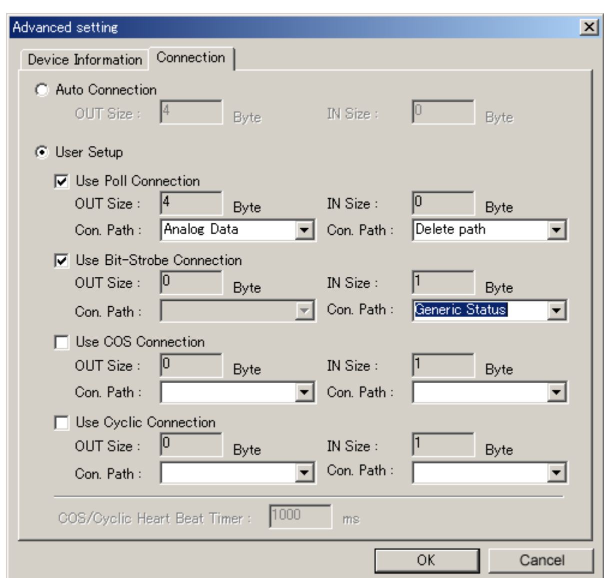
### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the **General** Tab, select the Analog Slave to be set from the device list, and click the **Advanced Setup** Button.

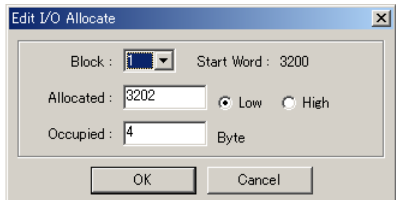



3. Click the **Connection** Tab, and select ***User Setup***. Select ***Use Poll Connection*** and then select ***Analog Data*** from the pull-down menu in the *Con. (Connection) Path* field for output. At the same time, select ***Use Bit-Strobe Connection***, and then select ***Generic Status*** from the pull-down menu in the *Con. Path* field for input.

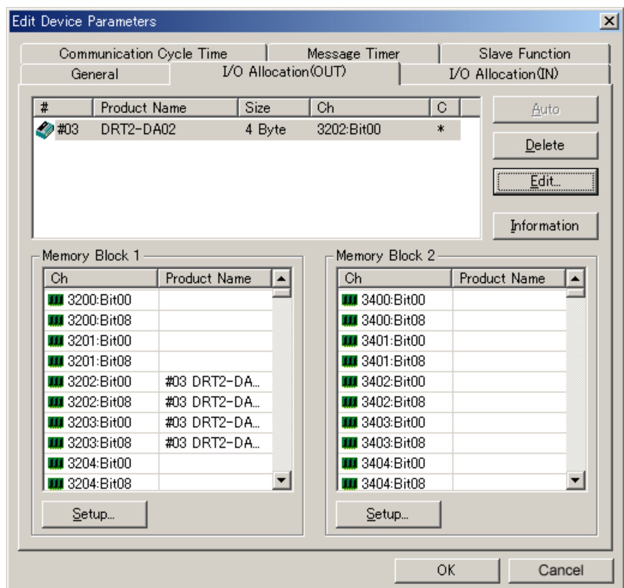



4. Click the **OK** Button.

5. Click the **I/O Allocation (IN)** or **I/O Allocation (OUT)** Tab, and edit the I/O allocations. Select the Smart Slave where the I/O allocations are to be edited and click the **Edit** Button to display the Edit I/O Allocate Window.
   In the following setting example, analog data allocations are set in the **I/O Allocation (OUT)** Tab Page. (In this example, I/O is allocated in block 1, allocated 3202 (word CIO 3202.)
   Allocate the Status Flags in the same area, setting them on the I/O Allocation (IN) Tab Page.




6. Click the **OK** Button and use the following window to confirm that I/O has been allocated correctly.




7. Return to the **General** Tab, and click the **Download** Button.
8. Click the **OK** Button and exit the window.

## I/O Data (Patterns)

### Analog Output Data (Instance 192)

Analog Output Data is used to allocate two words (four bytes) of output data in the Master. The data format used when data in the Master is allocated is shown below. Data is allocated as two's complements.

| 15          0 |
|---|
| **Analog output data for Output 0** |
| **Analog output data for Output 1** |

### Generic Status Flags (Instance 121)

The Generic Status Flag flags are allocated for monitoring flags with maintenance information (Network Power Voltage Monitor Flag, Unit Conduction Time Monitor Flag, and Analog Cumulative Counter Flag). The following data format is used when these flags are allocated in the Master (1 byte).

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The details of each bit are shown in the following table.

| Bit | Abbreviation | Name | Details |
|---|---|---|---|
| 0 | --- | --- | Reserved. (Always 0.) |
| 1 | --- | --- | Reserved. (Always 0.) |
| 2 | NPW | Network Power Voltage Monitor Flag | Turns ON when the Network power level drops below the set monitor value. |
| 3 | RHW | Unit Conduction Time Monitor Flag | Turns ON when the Unit ON time exceeds the set monitor value. |
| 4 | CCW | Analog Cumulative Counter Flag | Turns ON when any of the cumulated analog values exceeds the set monitor value. |
| 5 | MRF | Unit Error Flag | Turns ON when analog conversion stops due to a Unit error. |
| 6 | --- | --- | Reserved. (Always 0.) |

The following format is used when the Generic Status Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15     8 | 7     0 |
|---|---|---|
| +1 | | **Generic Status Flags** |

## 7-5-3 Functions and Setting Methods

### Scaling

The default setting is used to perform AD conversion, converting analog output values that have been scaled to a count of 0 to 6,000 into corresponding digital values in the output signal range. Scaling can be used to change scaled values that correspond to the output signal range into other values required by the user (industry unit values). Scaling also eliminates the need for ladder programming in the Master to perform math operations. The following two methods of scaling can be used.

**Default Scaling**

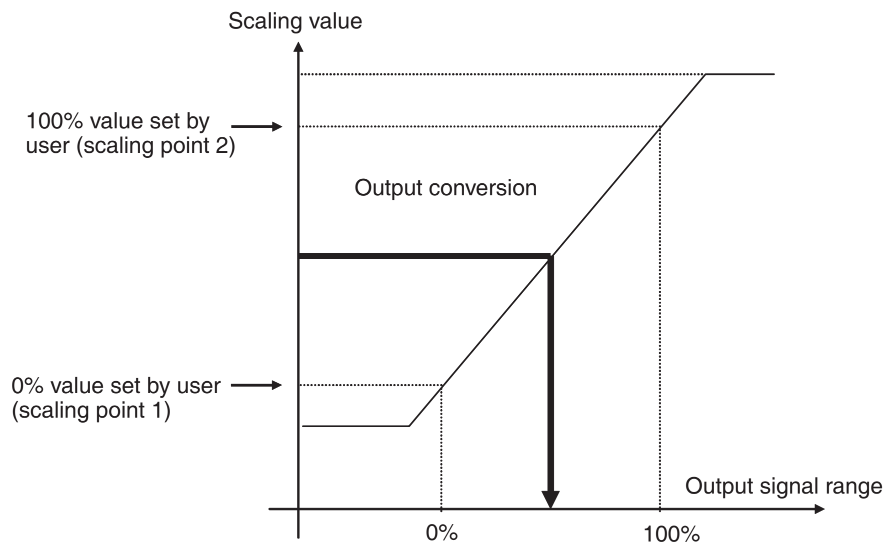
Default scaling converts analog output values into voltage or current values. The units used are mV or µA. When default scaling is selected, scaling is performed according to the output range, as shown in the following table.

| Output range | 0 to 5 V | 0 to 10 V | 1 to 5 V | –10 to 10 V | 0 to 20 mA | 4 to 20 mA |
|---|---|---|---|---|---|---|
| 100% | 5,000 mV | 10,000 mV | 5,000 mV | 10,000 mV | 20,000 µA | 20,000 µA |
| 0% | 0000 mV | 0000 mV | 1,000 mV | –10,000 mV | 0000 µA | 4,000 µA |

**User Scaling**

User scaling allows analog output values to be scaled to user-defined values. The conversion values for 100% and 0% are set using the Configurator.

| Input range | 0 to 5 V | 0 to 10 V | 1 to 5 V | –10 to 10 V | 0 to 20 mA | 4 to 20 mA |
|---|---|---|---|---|---|---|
| 100% | Set using Configurator (–28,000 to 28,000) | | | | | |
| 0% | Set using Configurator (–28,000 to 28,000) | | | | | |

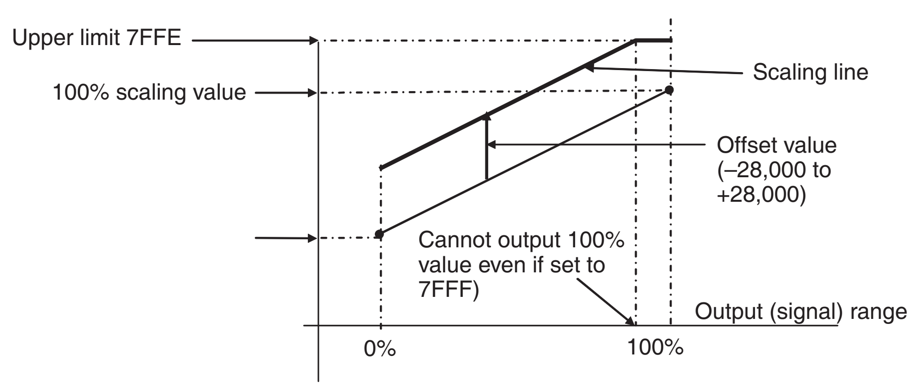



**Note** Reverse scaling, where the 0% scaling value is higher than the 100% scaling value, is also supported.

**Offset Compensation**

Offset compensation is used to compensate for error that occurs during scaling. The offset amount is added to the scaled line before processing, as shown in the following diagram. The offset (error) value can be input between –28,000 and 28,000, but if underflow or overflow occurs in the scaled line, the 100% or 0% output will not be possible. The High Limit is 7FFE hex and the Low Limit is 8000 hex.

**Note** The offset value can be set even when using default scaling.

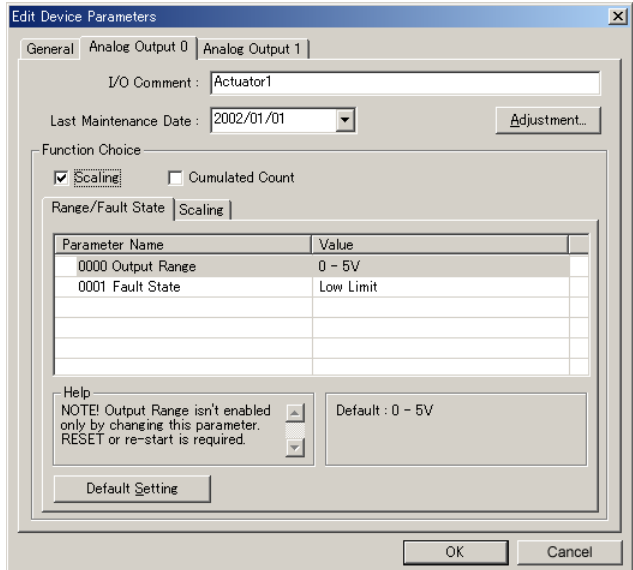



**Setting Using the DeviceNet Configurator**

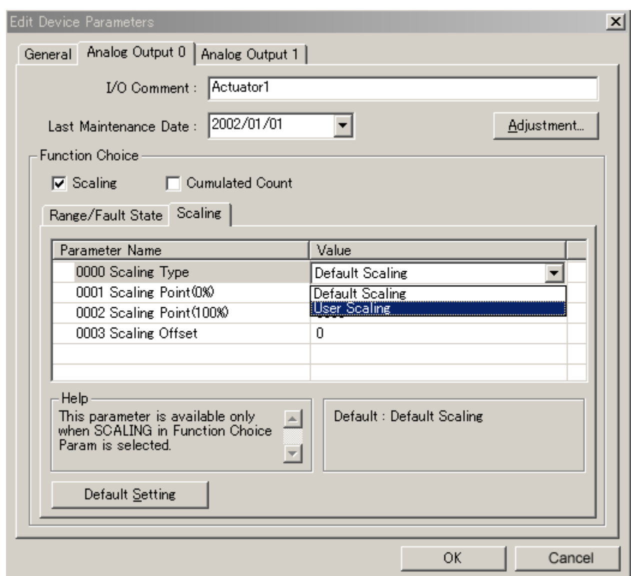
***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

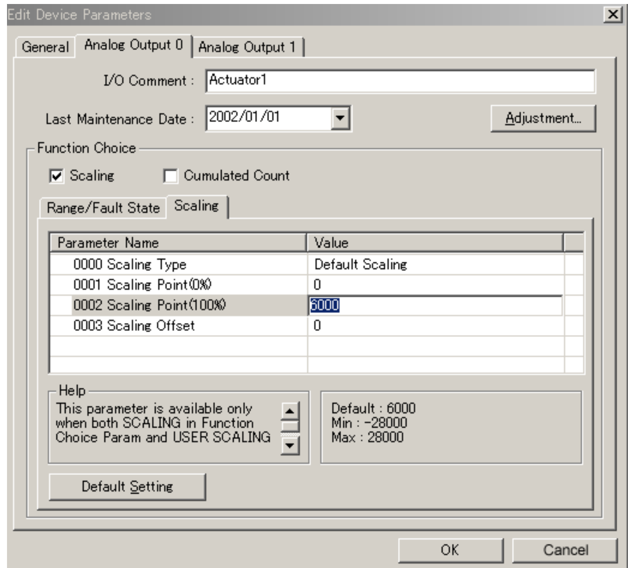
2. Select the Tab Page for the output where scaling is to be performed, and select ***Scaling*** under the *Function Choice* heading.



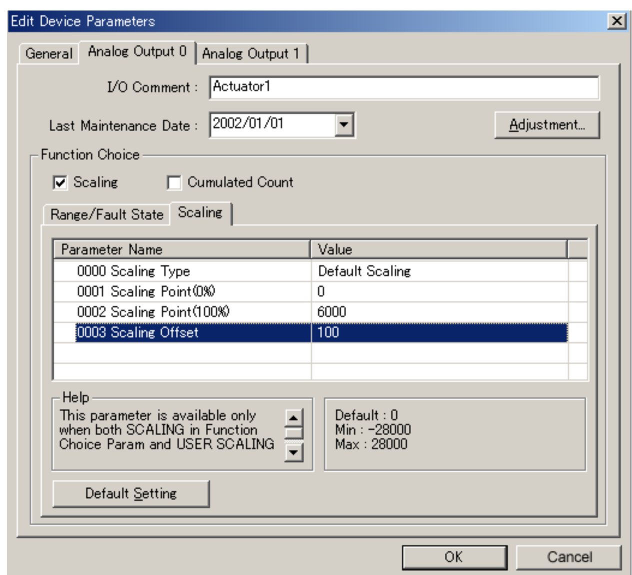

3. To select the scaling type, click the **Scaling** Tab, and select either ***Default Scaling*** or ***User Scaling***. The following example shows when *User Scaling* is selected.



4. For user scaling, set the 0% value in the *Scaling point 1* field, and set the 100% value in the *Scaling point 2* field.



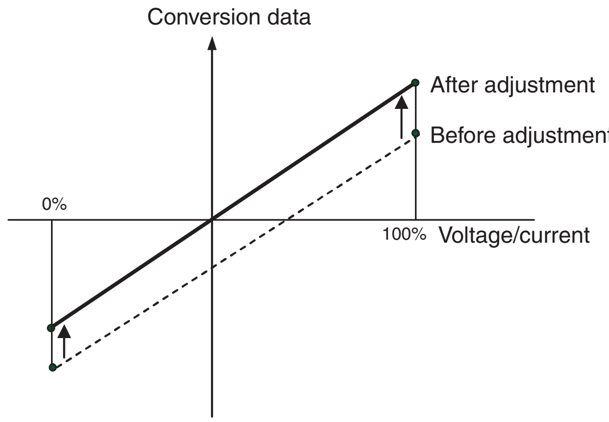

5. For offset compensation, set the offset value in the *Scaling Offset* field. Also select either ***Default Scaling*** or ***User Scaling*** in the *Scaling Type* field.




6. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
7. Click the **OK** Button and exit the window.

## User Adjustment

Depending on factors such as the characteristics and connection methods of the output device, the output can be adjusted to compensate for error in the final output. The following diagram shows when compensation is applied to the conversion line at the two points for 0% and 100%.




The ranges supported for adjustment (–5% to +5%) are shown in the following table. If adjustment cannot be performed within the following ranges, check the method being used to connect the output device.

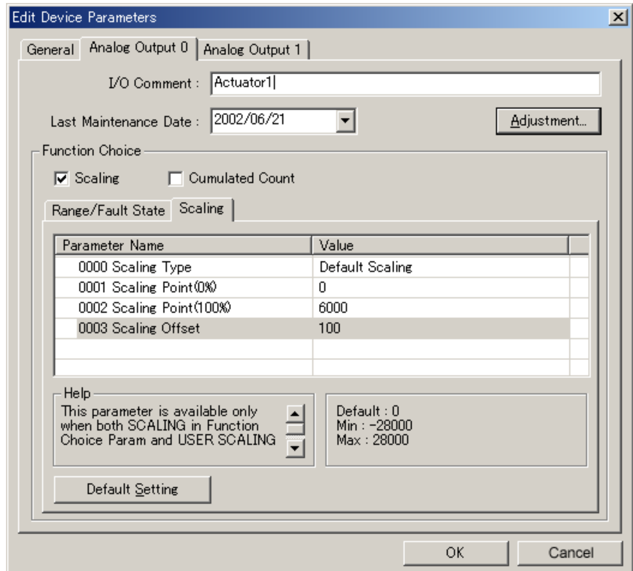
| Output range | Low Limit | High Limit |
|---|---|---|
| 0 to 5 V | –0.25 to 0.25 V | 4.75 to 5.25 V |
| 1 to 5 V | 0.8 to 1.2 V | 4.8 to 5.2 V |
| 0 to 10 V | –0.5 to 0.5 V | 9.5 to 10.5 V |
| –10 to 10 V | –11 to –9.0 V | 9.0 to 11 V |
| 4 to 20 mA | 3.2 to 4.8 mA | 19.2 to 20.8 mA |
| 0 to 20 mA | 0.2 to 1.0 mA | 19 to 21 mA |

### Setting Using the DeviceNet Configurator

***1,2,3...***

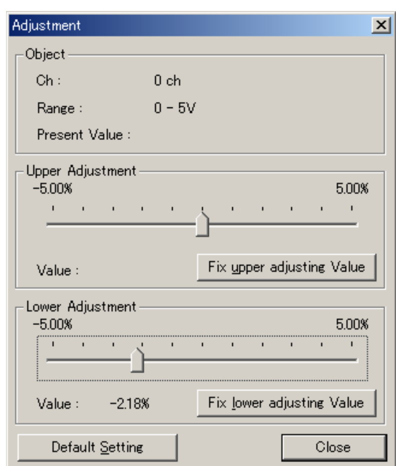
1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Select the Tab Page for the output to be adjusted, and click the **Adjustment** Button. (At the same time set the output range again.)




**Adjusting the Low Limit**

3. Output the value that is equivalent to 0% from the Master Unit. Always perform adjustment with the 0% value.
4. Adjust the analog value that is output from the terminal using the Low Limit slide bar, as shown in the following window. Repeat adjustments until the correct 0% value is output from the output device. After compensation is completed, click the **Fix lower adjusting value** Button.

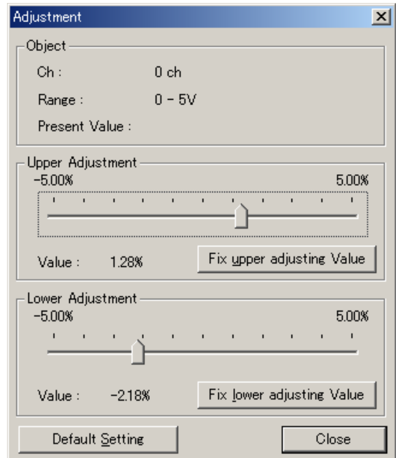



5. To return to the default settings, click the **Default Setting** Button
6. Close the Adjustment Window, return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
7. Click the **OK** Button and exit the window.

**Adjusting the High Limit**

8. Output the value from the Master Unit that is equivalent to the Output Unit's maximum (100%) value. Adjustment is best performed using the 100% value, but can be performed using a lower value.
9. Adjust the analog value that is output from the terminal using the High Limit slide bar, as shown in the following window. Repeat adjustments until the

correct 100% value is output from the output device. After compensation is completed, click the **Fix upper adjusting value** Button.

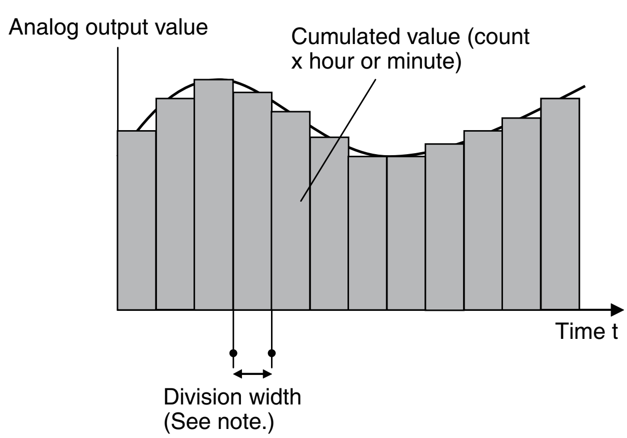



**Note** If the High Limit adjustment is not performed for the 100% value, a discrepancy will occur when the Low Limit is adjusted, so always adjust the Low Limit of Output Terminals before adjusting the High Limit.

## Cumulative Counter

The cumulative counter calculates an approximation to the integral of analog output values over time. The cumulated value can be calculated in “count hours” (by selecting “hours”) or “count minutes” (by selecting “minutes”). The count value is the analog output value in the industry unit obtained after scaling. For example, 100.0 count hours indicates a value equivalent to an analog output value of 100 counts continuing for one hour. The counter range for a four-byte area (two words) for count hours or count minutes is –214,748,364.8 to 214,748,364.7. Data is displayed on the Configurator in units of 0.1 hours or minutes.

Monitor values can also be set in the Unit. When the cumulated count value exceeds the set monitor value, the Cumulative Counter Flag in the area for Generic Status Flags turns ON.



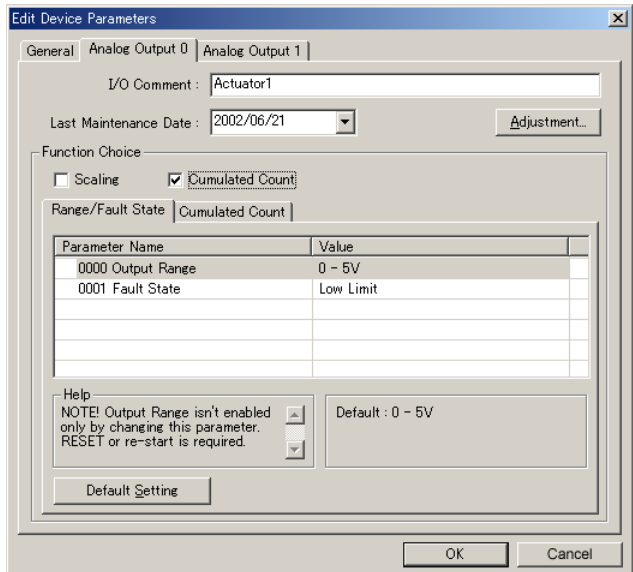

**Note** The following table shows the divisions for the cumulative counter.

| Unit | Divisions |
|---|---|
| Hour | 3.6 s (1/1,000 hour) |
| Minute | 60 ms (1/1,000 minute) |

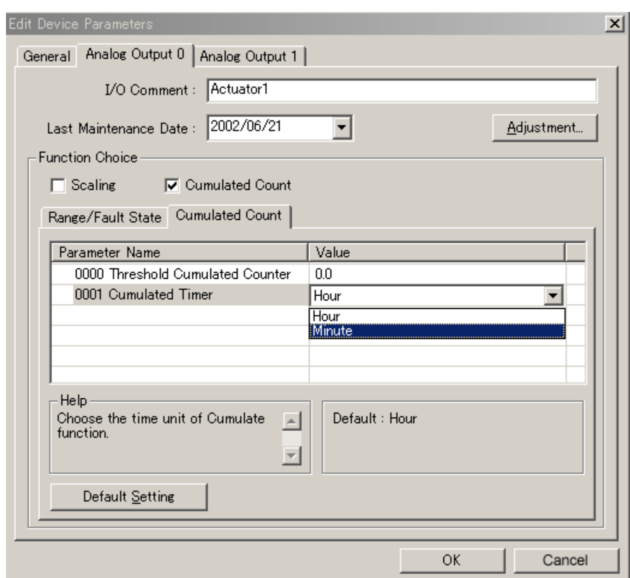
### Setting Using the DeviceNet Configurator

***1,2,3...***

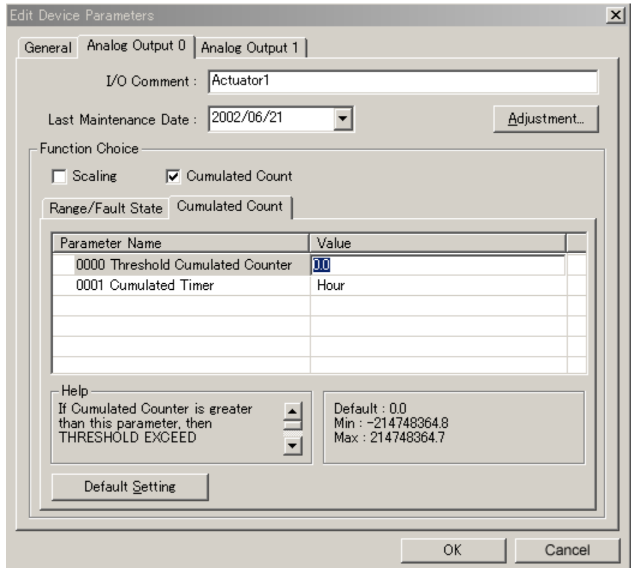
1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the output where the cumulated counter is to be set, and select ***Cumulated Count*** under the *Function Choice* heading.




3. To set the counter unit, click the **Cumulated Count** Tab and select ***Hour*** or ***Minute*** from the pull-down menu in the *Cumulated Timer* field.



4. To set the monitor value, click the **Cumulated Count** Tab, and input the desired value in the *Threshold Cumulated Counter* field.




5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

## Setting Output Value for Errors

The value that is output when communications errors (time-out and BusOff errors) occur can be set for each output. The four output value settings are set using the Configurator.

### Setting Patterns

| | |
|---|---|
| Low limit | Outputs the values in the following table according to the output range. |
| High limit | Outputs the values in the following table according to the output range. |
| Hold last state | Holds and outputs the value from immediately before the error occurred. |
| Zero count | Outputs the value when 0 is written from the Host. This setting will be affected by scaling settings that are used. |

### Output Ranges and Values

| Output range | Low limit | High limit | Hold last state |
|---|---|---|---|
| 0 to 5 V | –0.25 V | 5.25 V | Holds value. |
| 1 to 5 V | 0.8 V | 5.2 V | Holds value. |
| 0 to 10 V | –0.5 V | 10.5 V | Holds value. |
| –10 to 10 V | –11 V | 11 V | Holds value. |
| 4 to 20 mA | 3.2 mA | 20.8 mA | Holds value. |
| 0 to 20 mA | 0 mA | 21 mA | Holds value. |

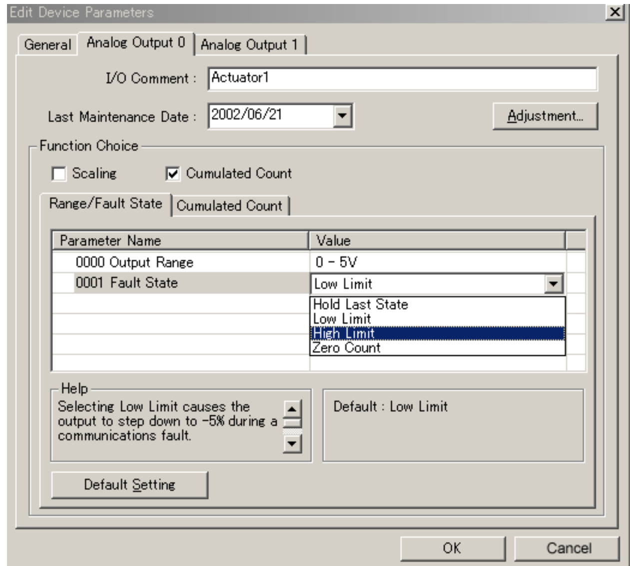
**Note** When a node address has been used more than once or a Unit error has occurred, the current output will be 0 mA and the voltage output will be 0 V, regardless of the setting.

### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Analog Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit.***)

2. Select the Tab Page for the output where the error output value is to be set, and select the desired item from the pull-down menu in the *Fault State* field.




3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.]

# 7-6 Temperature Input Terminals

## 7-6-1 DRT2-TS04T and DRT2-TS04P Temperature Input Terminals

### General Specifications

| Item | Specifications | |
|---|---|---|
| Model | DRT2-TS04T | DRT2-TS04P |
| Input type | Thermocouple input | Platinum resistance thermometer input |
| Number of I/O points | 4 inputs (Occupies 4 input words in the Master when normal display mode is selected or 8 input words when 1/100 display mode is selected.) | |
| Communications power supply voltage | 11 to 25 VDC (supplied through communications connector) | |
| Current consumption | 70 mA max. (24 VDC), 110 mA max. (11 V DC) | |
| Noise immunity | Conforms to IEC61000-4-4, 2.0 kV | |
| Vibration resistance | 10 to 150 Hz, 0.7 mm double amplitude | |
| Shock resistance | 150 m/s$^2$ | |
| Dielectric strength | 500 VAC between isolated circuits | |
| Insulation resistance | 20 MΩ min. at 100 V DC (default value) | |
| Ambient temperature | Operating: –10 to 55°C (with no icing or condensation)<br>Storage: –25 to 65°C | |
| Ambient operating humidity | 25% to 85% | |
| Atmosphere | Must be free from corrosive gases. | |
| Mounting method | 35-mm DIN track mounting | |
| Mounting strength | 50 N (10 N in the DIN track direction) | |
| Screw tightening torque | M3: 0.5 N·m | |

<table>
<tr><th>Item</th><th colspan="2">Specifications</th></tr>
<tr><td>Terminal strength</td><td colspan="2">Pulling: 50 N</td></tr>
<tr><td>Weight</td><td>160 g max.</td><td>160 g max.</td></tr>
</table>

## Performance Specifications

<table>
<tr><th>Item</th><th colspan="2">Specifications</th></tr>
<tr><td>Model</td><td>DRT2-TS04T</td><td>DRT2-TS04P (See note 1.)</td></tr>
<tr><td>Input type</td><td>Switchable between R, S, K1, K2, J1, J2, T, B, L1, L2, E, U, N, W, and PLII<br>When set with Configurator: Input types can be set individually for each input.<br>Wen set with DIP switch: The same input type setting applies to all 4 inputs.</td><td>Switchable between PT, JPT, PT2, and JPT2<br>When set with Configurator: Input types can be set individually for each input.<br>Wen set with DIP switch: The same input type setting applies to all 4 inputs.</td></tr>
<tr><td>Indicator accuracy</td><td>(±0.3% of indication value or ±1°C, whichever is larger) ±1 digit max.<br>(See note 2.)<br>Indicator Accuracy in Exceptional Cases
<table>
<tr><th>Input type and temperature range</th><th>Indicator accuracy</th></tr>
<tr><td>K1, K2, T, and N below –100°C</td><td>±2°C ±1 digit max.</td></tr>
<tr><td>U, L1, and L2</td><td>±2°C ±1 digit max.</td></tr>
<tr><td>R and S below 200°C</td><td>±3°C ±1 digit max.</td></tr>
<tr><td>B below 400°C</td><td>Not specified.</td></tr>
<tr><td>W</td><td>±0.3% of indication value or ±3°C (whichever is larger) ±1 digit max.</td></tr>
<tr><td>PLII</td><td>±0.3% of indication value or ±2°C (whichever is larger) ±1 digit max.</td></tr>
</table></td><td>–200 to 850°C input range:<br>(±0.3% of indication value or ±0.8°C, whichever is larger) ±1 digit max.<br>–200 to 200°C input range:<br>(±0.3% of indication value or ±0.5°C, whichever is larger) ±1 digit max.</td></tr>
<tr><td>Conversion cycle</td><td colspan="2">250 ms/4 points</td></tr>
<tr><td>Temperature conversion data</td><td colspan="2">Hexadecimal data (4-digit hexadecimal when normal display mode is selected or 8-digit hexadecimal when 1/100 display mode is selected.)</td></tr>
<tr><td>Isolation method</td><td colspan="2">Between input and communication lines: Photocoupler isolation<br>Between temperature input signals: Photocoupler isolation</td></tr>
</table>

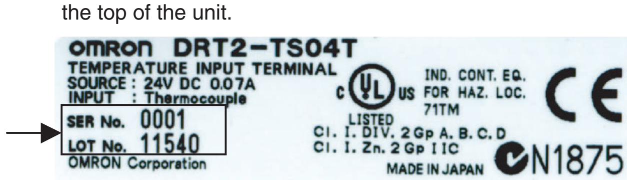
**Note**
1. A current of 0.35 mA flows to sensors connected to the DRT2-TS04P.
2. The indicator accuracy specifications differ depending on the mounting direction. Refer to the above table for details.

**Indicator accuracy when only the Unit or the Terminal Block is replaced**

In the DRT2-TS04T, a cold junction compensator is included in the Terminal Block. The indicator accuracy will be reduced depending on the mounting direction if only the Terminal Unit is replaced and the Lot No. and serial No. of the Terminal Block and Terminal Unit do not match. The Lot No. and serial No. of the Terminal Block and Terminal Unit can be found on the labels affixed to the products as shown below.

**Terminal Unit Label**

Remove the terminal block. The label is affixed to the top of the unit.




**Terminal Block Label**

The label is affixed to the left side of the terminal block.

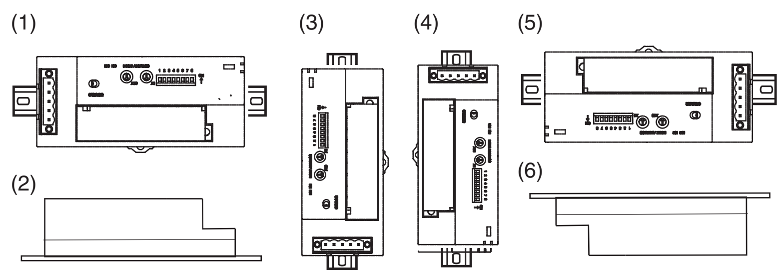
SER No.
0001
LOT No.
11540

If the Lot No. and serial No. of the terminal block and unit are the same, basic performance specifications apply regardless of the mounting direction. If the numbers are different, the following indication accuracies apply.

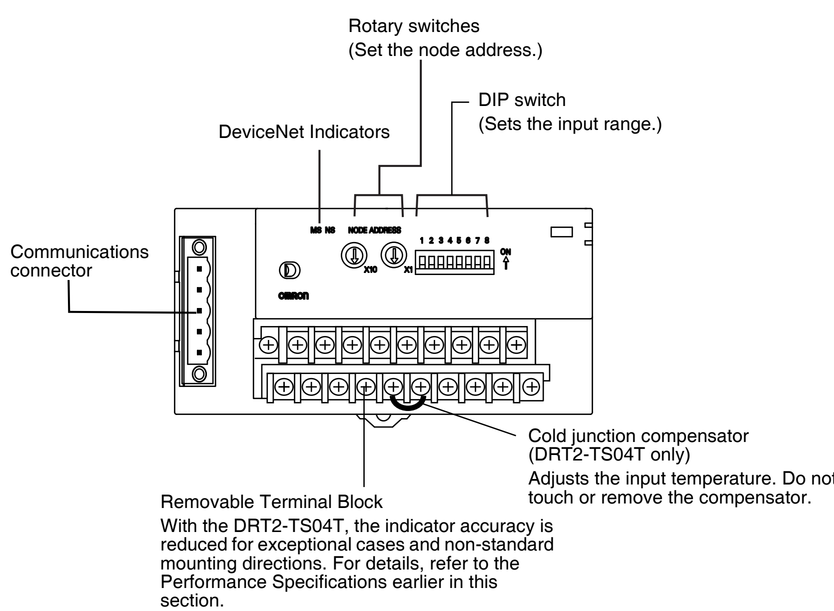
| Mounting direction | Indication accuracies |
|---|---|
| Mounted normally (1) | As specified in the Performance Specifications. |
| Mounted in any other direction other than (1) | (±0.3% of indication value or ±2 °C, whichever is greater) ±1 digit max. |

**Indicator Accuracy in Exceptional Cases**

| Input type and temperature range | Indication accuracies |
|---|---|
| K1, K2, T, and N below –100°C | ±3°C ±1 digit max. |
| U, L1, and L2 | ±3°C ±1 digit max. |
| R and S below 200°C | ±4°C ±1 digit max. |
| B below 400°C | Not specified. |
| W | ±0.3% of indication value or ±4°C (whichever is larger) ±1 digit max. |
| PLII | ±0.3% of indication value or ±3°C (whichever is larger) |



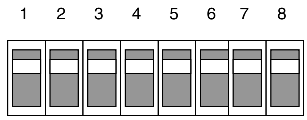

## Names and Functions of Parts



## Setting the Input Type

### Setting with the DIP Switch

The input type can be set using the DIP switch or the Configurator.




Set each pin according to the following table.lp

| Pin No. | Setting | Specifications |
|---|---|---|
| SW1 | The settings on pins 1 to 4 select the input type (input range). See the following table for the various combinations and corresponding input type settings. | This setting is enabled only when pin 8 is ON.<br>Default setting: All pins OFF |
| SW2 | | |
| SW3 | | |
| SW4 | | |
| SW5 | Sets the temperature display to normal or 1/100 display mode. (Displays data to 0.01 precision.) | ON: 1/100 display mode<br>OFF: Normal display mode<br>Default setting: OFF |
| SW6 | Selects °C or °F display. | OFF: °C conversion<br>ON: °F conversion<br>Default setting: OFF |
| SW7 | Sets the temperature display to DRT1-compatible 1/100 display mode. (Displays data to 0.01 precision.) | ON: DRT1 1/100 display mode<br>OFF: Not used.<br>When pin 7 is ON, the DRT1-compatible 1/100 display mode will be used, regardless of the setting of pin 5.<br>Default setting: OFF |
| SW8 | Selects the input type setting method.<br>When the input type is set with the DIP switch, all 4inputs are set to the same input type.<br>To set different input types, use the Configurator to make the settings. | OFF: Set with Configurator.<br>ON: Set with DIP switch.<br>The other DIP switch pin settings are disabled when pin 8 is OFF.<br>Default setting: OFF |

**DRT2-TS04T**

| SW1 | SW2 | SW3 | SW4 | Input type |
|---|---|---|---|---|
| OFF | OFF | OFF | OFF | R |
| ON | OFF | OFF | OFF | S |
| OFF | ON | OFF | OFF | K1 |
| ON | ON | OFF | OFF | K2 |
| OFF | OFF | ON | OFF | J1 |
| ON | OFF | ON | OFF | J2 |
| OFF | ON | ON | OFF | T |
| ON | ON | ON | OFF | E |
| OFF | OFF | OFF | ON | L1 |
| ON | OFF | OFF | ON | L2 |
| OFF | ON | OFF | ON | U |
| ON | ON | OFF | ON | N |
| OFF | OFF | ON | ON | W |
| ON | OFF | ON | ON | B |
| OFF | ON | ON | ON | PLII |
| ON | ON | ON | ON | Not used. |

If the settings are incorrect, the MS Indicator will flash red and the Unit will not operate. In this case, make the settings again and reset the power supply.

**DRT2-TS04P**

| SW1 | SW2 | SW3 | SW4 | Input type |
|---|---|---|---|---|
| OFF | OFF | Always OFF. | | PT |
| ON | OFF | | | JPT |
| OFF | ON | | | PT2 |
| ON | ON | | | JPT2 |

If the settings are incorrect, the MS Indicator will flash red and the Unit will not operate. In this case, make the settings again and reset the power supply.

**Note**

1. Always set pin 8 to ON if the DIP switch is used to set the ranges. If this pin is OFF, the DIP switch settings will not be enabled.
2. The DIP switch settings are read when the power is turned ON.
3. The 1/100 display mode and °C/°F display settings cannot be set individually for each input.
4. When the display mode is set to 1/100 display mode with the DIP switch (pin 5 ON), the connection path must be set with the configurator. Refer to *7-6-2 Temperature Input Terminal Display Modes* for details.
   If "1/100 display" is not selected in the I/O data in the connection path settings from the Configurator, the temperature data will be 0.
5. When a DRT1-series Temperature Input Terminal (DRT1-TS04T or DRT1-TS04P) is being replaced with one of these DRT2-series Slaves and the 1/100 display mode is being used, refer to the following table and set the appropriate display mode.

| SW7 | SW5 | Display mode |
|---|---|---|
| OFF | OFF | Normal display |
| OFF | ON | 1/100 display |
| ON | Not used. | DRT1-compatible 1/100 display |

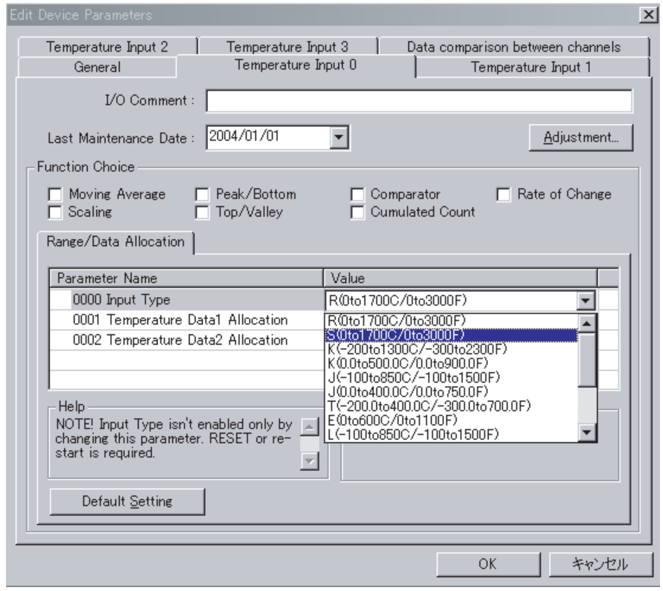
**Setting Using the DeviceNet Configurator**

Use the following procedure to set the input type for each input using the Configurator.

***1,2,3...***

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where the sensor settings will be set.

3. Select the desired sensor from the pull-down menu in the *Sensor Type* field.




4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

## Temperature Ranges by Input Type

The input type can be set with the DIP switch or Configurator. The following tables show the temperature ranges for each input type.

### DRT2-TS04T

| Specification | Input type | Temperature range (°C) | Temperature range (°F) |
|---|---|---|---|
| R | R | 0 to 1,700 | 0 to 3,000 |
| S | S | 0 to 1,700 | 0 to 3,000 |
| K | K1 | –200 to 1,300 | –300 to 2,300 |
| | K2 | 0.0 to 500.0 | 0.0 to 900.0 |
| J | J1 | –100 to 850 | –100 to 1,500 |
| | J2 | 0.0 to 400.0 | 0.0 to 750.0 |
| T | T | –200.0 to 400.0 | –300.0 to 700.0 |
| E | E | 0 to 600 | 0 to 1,100 |
| L | L1 | –100 to 850 | –100 to 1,500 |
| | L2 | 0.0 to 400.0 | 0.0 to 750.0 |
| U | U | –200.0 to 400.0 | –300.0 to 700.0 |
| N | N | –200 to 1,300 | –300 to 2,300 |
| W | W | 0 to 2,300 | 0 to 4,100 |
| B | B | 100 to 1,800 | 300 to 3,200 |
| PLII | PLII | 0 to 1,300 | 0 to 2,300 |

### DRT2-TS04P

| Specification | Input type | Temperature range (°C) | Temperature range (°F) |
|---|---|---|---|
| Pt100 | PT | –200.0 to 850.0 | –300.0 to 1,500.0 |
| JPt100 | JPT | –200.0 to 650.0 | –300.0 to 1,200.0 |
| Pt100 | PT2 | –200.0 to 200.0 | –300.0 to 380.0 |
| JPt100 | JPT2 | –200.0 to 200.0 | –300.0 to 380.0 |

**Note** The temperature ranges listed above are the ranges in which the input accuracy is within the specified range.

## Convertible Temperature Ranges

The convertible data range depends on the selected sensor, as shown in the following tables.

### DRT2-TS04T

| Input type | °C | Display | °F | Display |
|---|---|---|---|---|
| R | –20 to 1,720 | FFEC to 06B8 | –20 o 3,020 | FFEC to 0BCC |
| S | –20 to 1,720 | FFEC to 06B8 | –20 to 3,020 | FFEC to 0BCC |
| K1 | –220 to 1,320 | FF24 to 0528 | –320 to 2,320 | FEC0 to 0910 |
| K2 | –20.0 to 520.0 | FF38 to 1450 | –20.0 to 920.0 | FF38 to 23F0 |
| J1 | –120 to 870 | FF88 to 0366 | –120 to 1,520 | FF88 to 05F0 |
| J2 | –20.0 to 420.0 | FF38 to 1068 | –20.0 to 770.0 | FF38 to 1E14 |
| T | –220.0 to 420.0 | F768 to 1068 | –320.0 to 720.0 | F380 to 1C20 |
| E | –20 to 620 | FFEC to 026C | –20 to 1,120 | FFEC to 0460 |
| L1 | –120 to 870 | FF88 to 0366 | –120 to 1,520 | FF88 to 05F0 |
| L2 | –20.0 to 420.0 | FF38 to 1068 | –20.0 to 770.0 | FF38 to 1E14 |
| U | –220.0 to 420.0 | F768 to 1068 | –320.0 to 720.0 | F380 to 1C20 |
| N | –220 to 1,320 | FF24 to 0528 | –320 to 2,320 | FEC0 to 0910 |
| W | –20 to 2,320 | FFEC to 0910 | –20 to 4,120 | FFEC to 1018 |
| B | 80 to 1,820 | 0050 to 071C | 280 to 3,220 | 0118 to 0C94 |
| PLII | –20 to 1,320 | FFEC to 0528 | –20 to 2,320 | FFEC to 0910 |

**Note**

1. The display data will be clamped at the minimum value when the value is below the minimum display value but higher than the value at which an off-wire condition is detected.
2. When an off-wire condition is detected, the display data will be 7FFF. (In 1/100 display mode, the display data will be 7FFF FFFF.)

### DRT2-TS04T

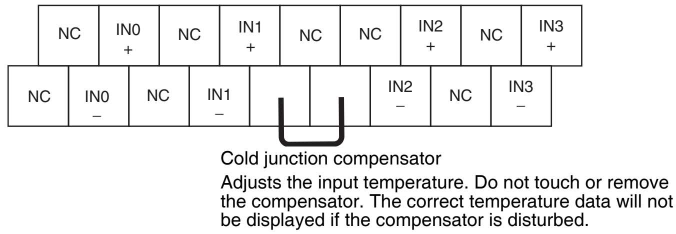
| Input type | °C | Display | °F | Display |
|---|---|---|---|---|
| PT | –220.0 to 870.0 | F768 to 21FC | –320.0 to 1,520.0 | F380 to 3B60 |
| JPT | –220.0 to 670.0 | F768 to 1A2C | –320.0 to 1,220.0 | F380 to 2FA8 |
| PT2 | –220.0 to 220.0 | F768 to 0898 | –320.0 to 400.0 | F380 o 0FA0 |
| JPT2 | –220.0 to 220.0 | F768 to 0898 | –320.0 to 400.0 | F380 to 0FA0 |

**Note**

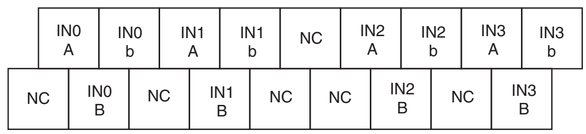
1. If the Unit is subjected to sudden temperature changes, moisture may condense in the Unit and cause incorrect indications. If there is condensation, remove the Unit from service and keep it at a steady temperature for about 1 hour before using it again.
2. If the input temperature exceeds the convertible range, the temperature data will be clamped at the minimum or maximum value.
   If the temperature exceeds the convertible range by a certain value, an off-wire condition (broken or disconnected input wire) will be detected and the temperature data will be set to 7FFF. If the input temperature returns to the convertible range, the off-wire detection function will be reset automatically and normal conversion data will be stored.

## Terminal Arrangement

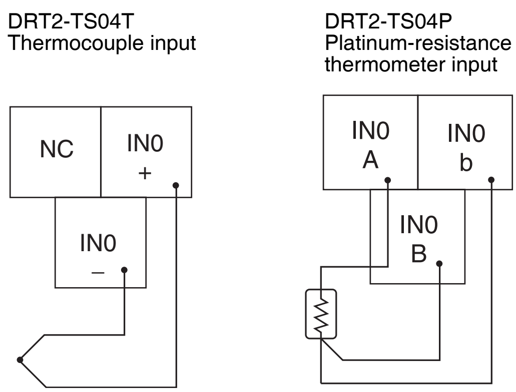
**DRT2-TS04T**



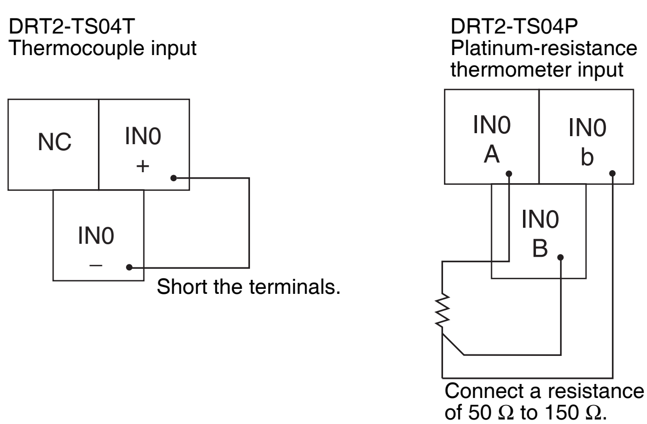

**DRT2-TS04P**




## Wiring




**Note** When all of the inputs are not being used, an off-wire condition may be detected in the unused, open input terminal. To prevent an off-wire detection, wire the unused input terminals as shown in the following diagram.



## 7-6-2 Temperature Input Terminal Display Modes

### Normal Display Mode (Default Setting)

The input temperature data is converted to 4-digit hexadecimal digital data and transmitted to the Master. If the conversion data is negative, the negative value is expressed as the two's complement.

The four inputs occupy 4 words in the Master, as shown in the following diagram. If the input type's data has 0.1 digits, the value transmitted to the master is 10 times the actual value. (The decimal point is omitted.)

| | 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |
|---|---|
| First word + 0 | Input 0 Temperature conversion data |
| First word + 1 | Input 1 Temperature conversion data |
| First word + 2 | Input 2 Temperature conversion data |
| First word + 3 | Input 3 Temperature conversion data |

- Example 1: R type thermocouple at 1,000°C
  1,000 converted to hexadecimal → 03E8 hex
- Example 2: U type thermocouple at 350.0°C
  $350 \times 10 = 3{,}500$ converted to hexadecimal → 0DAC hex

### 1/100 Display Mode

The input temperature data for all input types is transmitted to the Master as data with precision to 0.01 digits. The temperature data is multiplied by 100 and converted to 8-digit hexadecimal digital data (four long values).

If the conversion data is negative, the negative value is expressed as the two's complement.

The four inputs occupy 8 words in the Master, as shown in the following diagram.

| | 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |
|---|---|
| First word + 0 | Input 0 Temperature conversion data (rightmost) |
| First word + 1 | Input 0Temperature conversion data (leftmost) |
| First word + 2 | Input 1 Temperature conversion data (rightmost) |
| First word + 3 | Input 1 Temperature conversion data (leftmost) |
| First word + 4 | Input 2 Temperature conversion data (rightmost) |
| First word + 5 | Input 2 Temperature conversion data (leftmost) |
| First word + 6 | Input 3 Temperature conversion data (rightmost) |
| First word + 7 | Input 3 Temperature conversion data (leftmost) |

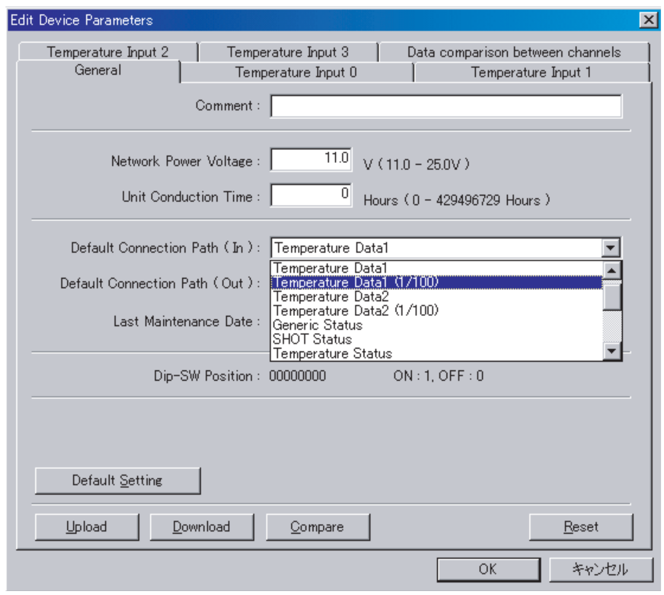
- Example 1: 850.00°C
  850 × 100 = 85,000 converted to hexadecimal → 0001 4C08 hex
  Rightmost data = 4C08 hex; Leftmost data = 0001 hex
- Example 2: –200.00°C
  –200 × 100 = –20,000 converted to hexadecimal → FFFF B1E0 hex
  Rightmost data = B1E0 hex; Leftmost data = FFFF hex

### Setting the 1/100 Display Mode

#### ■ Using the Slave's Default Connection Path

***1,2,3...***

1. Turn ON pin 5 of the Slave's DIP switch. (Select 1/100 display mode.)
2. Turn ON the Master and Slave power supplies. At this point, the Slave will not be in 1/100 display mode.
3. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window.



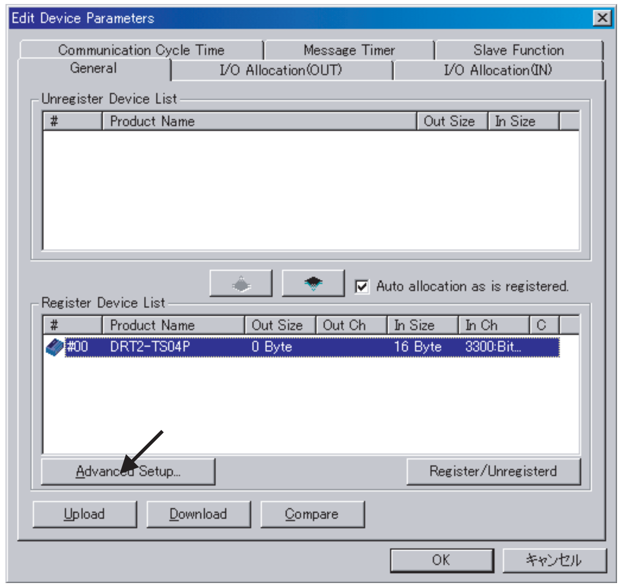

4. Select ***Temperature Data1 (1/100)*** or ***Temperature Data2 (1/100)*** from the pull-down menu in the *Default Connection Path (In)* field. Click the **Download** Button and then click the **Reset** Button to reset the Unit.

#### ■ Using the Master's Connection Path

***1,2,3...***

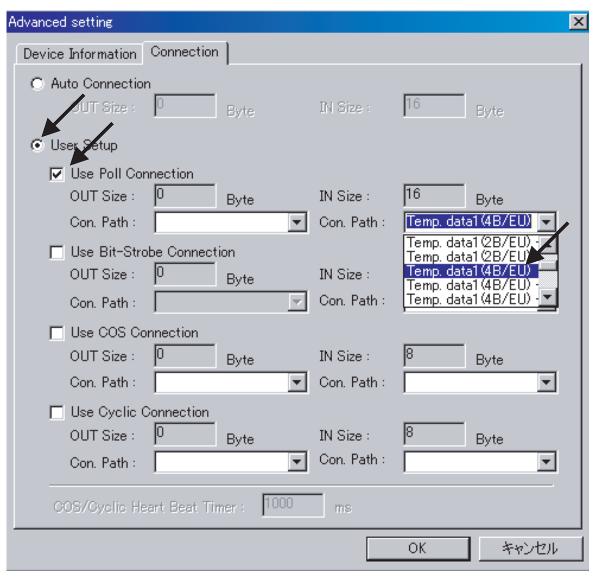
1. Turn ON pin 5 of the Slave's DIP switch. (Select 1/100 display mode.)
2. Turn ON the Master and Slave power supplies. At this point, the Slave will not be in 1/100 display mode.
3. Double-click the icon of the Master to be set in the Main Window and open the Edit Device Parameters Window.

4. Select a Slave in the *Register Device* list and click the **Advanced Setup** Button to open the Advanced setting Window.

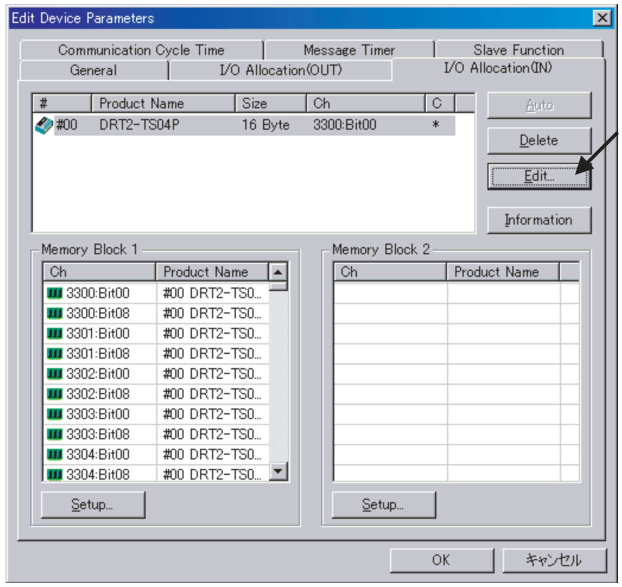



5. Click the **Connection** Tab, select ***User Setup***, and select the type of connection being used. Select ***Temp. data1 (4B/EU)*** from the pull-down menu in the *Con. (Connection) Path* field for input and then click the **OK** Button.

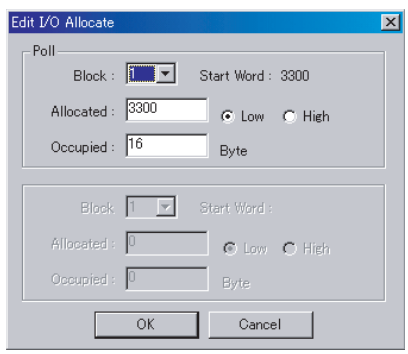
   **Note** The 1/100 display mode cannot be selected when a Bit-Strobe connection is being used.



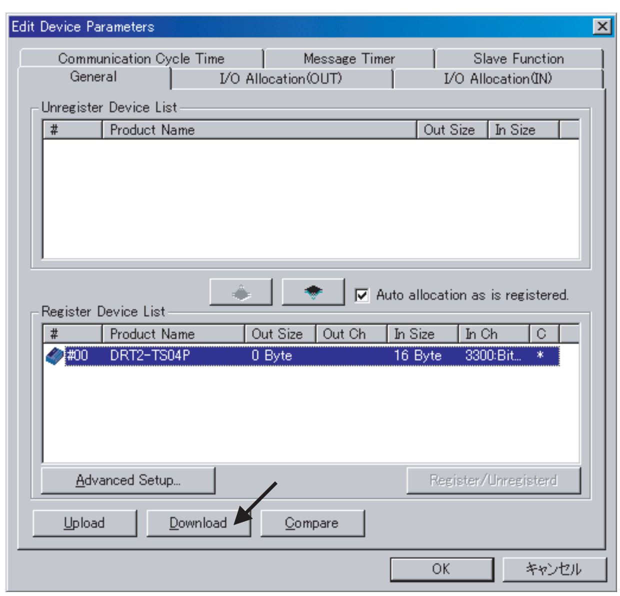
6. Return to the Edit Device Parameters Window and click the **I/O Allocation (IN)** Tab. Click the **Edit** Button to display the Edit I/O Allocate Window.



7. Set the allocated words in the Edit I/O Allocate Window,



8. Click the **General** Tab in the Edit Device Parameters Window and click the **Download** Button. The Master will be reset and will restart with the specified connection type, I/O data, and allocated words.



**Note**

1. After selecting 1/100 display mode by turning ON pin 5 of the DIP switch, the 1/100 display mode must be enabled by setting the connection path with the Configurator.
   If the normal display mode is selected for the I/O data in the Configurator, the temperature data will be 0.
2. In 1/100 display mode, the temperature data will be converted to two decimal places, but the display for temperatures in the 0.1°C/°F or 0.01°C/°F ranges may jump back and forth between values. Treat those digits as reference data. For the number of sensor digits displayed in normal mode, refer to *Temperature Ranges by Input Type* on page 388.

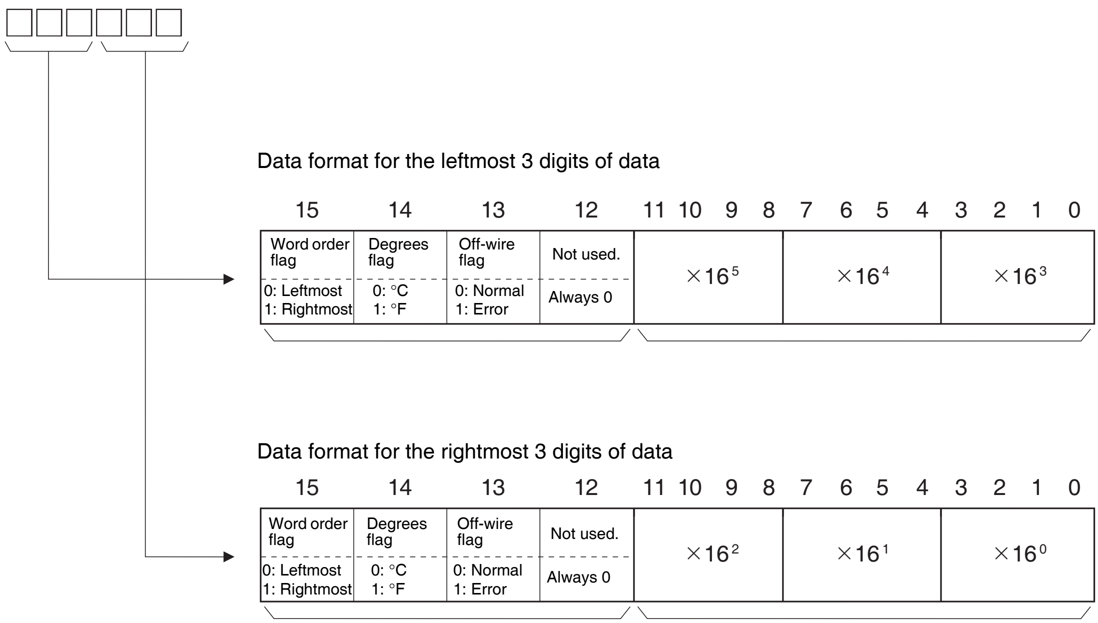
## DRT1-compatible 1/100 Display Mode

The input temperature data for all input types is transmitted to the Master as data with precision to 0.01 digits. In DRT1-compatible 1/100 display mode, a single temperature data value is multiplied by 100 and transmitted to the Master as 6-digit signed hexadecimal data (4 integer digits and 2 digits below the decimal point). At this point, the data is divided into two words and the two words are transmitted alternately at 125-ms intervals (each word contains one part of the temperature value).

The four inputs occupy 4 words in the Master, as shown in the following diagram.

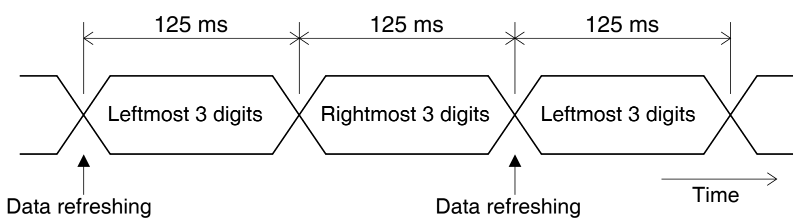
| | 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |
|---|---|
| First word + 0 | Input 0 Temperature conversion data |
| First word + 1 | Input 1 Temperature conversion data |
| First word + 2 | Input 2 Temperature conversion data |
| First word + 3 | Input 3 Temperature conversion data |

The following diagram shows how the temperature data is divided into two words and the structure of each word.




Word order flag: Indicates whether the word contains the rightmost or leftmost 3 digits.
Degrees flag: Indicates whether the temperature units are °C or °F.
Off-wire flag: A value of 1 indicates an off-wire condition was detected. In this case, the leftmost 3 digits will be 7FF and the rightmost digits will be FFF.

The rightmost 3 digits and leftmost 3 digits are sent to the Master alternately in 125-ms intervals, as shown in the following diagram.



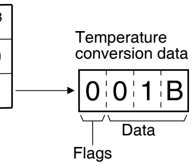

**Example 1: 1130.25 °C**

Temperature × 100: 113,025
Transmitted value: 01B981 (113,025 in hexadecimal)

Leftmost 3 digits

| | Flags | | | | $\times16^5$ | $\times16^4$ | $\times16^3$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 0 | 0 | 0 | 0 | 0 | 1 | B |

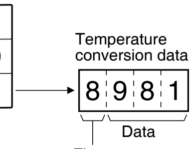
Leftmost digits °C Normal




Rightmost 3 digits

| | Flags | | | | $\times16^2$ | $\times16^1$ | $\times16^0$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 1 | 0 | 0 | 0 | 9 | 8 | 1 |

Rightmost digits °C Normal



**Example 2: –100.12°C**

Temperature × 100: –10,012
Transmitted value: FFD8E4 (–10,012 in hexadecimal)

Leftmost 3 digits

| | Flags | | | | $\times 16^5$ | $\times 16^4$ | $\times 16^3$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 0 | 0 | 0 | 0 | F | F | D |

Leftmost digits °C Normal

Temperature conversion data → 0 F F D (Flags / Data)

Rightmost 3 digits

| | Flags | | | | $\times 16^2$ | $\times 16^1$ | $\times 16^0$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 1 | 0 | 0 | 0 | 8 | E | 4 |

Rightmost digits °C Normal

Temperature conversion data → 8 8 E 4 (Flags / Data)

**Example 3: –200.12°C**

Temperature × 100: –20,012
Transmitted value: FFB1D4 (–20,012 in hexadecimal)

Leftmost 3 digits

| | Flags | | | | $\times 16^5$ | $\times 16^4$ | $\times 16^3$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 0 | 1 | 0 | 0 | F | F | B |

Leftmost digits °F Normal

Temperature conversion data → 4 F F B (Flags / Data)

Rightmost 3 digits

| | Flags | | | | $\times 16^2$ | $\times 16^1$ | $\times 16^0$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 1 | 1 | 0 | 0 | 1 | D | 4 |

Rightmost digits °F Normal

Temperature conversion data → C 1 D 4 (Flags / Data)

**Example 4: Input Error (Off-wire) with °F Temperature Data**

Transmitted value: 7FFFFF

Leftmost 3 digits

| | Flags | | | | $\times 16^5$ | $\times 16^4$ | $\times 16^3$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 0 | 1 | 1 | 0 | 7 | F | F |

Leftmost digits °F Error

Temperature conversion data → 6 7 F F (Flags / Data)

Rightmost 3 digits

| | Flags | | | | $\times 16^2$ | $\times 16^1$ | $\times 16^0$ |
|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 to 8 | 7 to 4 | 3 to 0 |
| | 1 | 1 | 1 | 0 | F | F | F |

Rightmost digits °F Error

Temperature conversion data → E F F F (Flags / Data)

**Note** 1. Data is transmitted in the order: leftmost 3 digits → rightmost 3 digits. When reading the temperature data in the program, always read it in the same order (leftmost 3 digits → rightmost 3 digits).

2. Consider the PLC's cycle time and communications time and make adjustments if necessary so that the data read cycle is less than 125 ms. If the data read cycle exceeds 125 ms, it will not be possible to read the correct data.

### ■ Sample Program (for DRT2-TS04T or DRT2-TS04P)

The following sample program is a CS1 ladder program for use with a Temperature Input Terminal operating in DRT1-compatible 1/100 display mode.

**Temperature Input Terminal's Settings**

Allocated words: CIO 3300 to CIO 3303

Display mode: DRT1-compatible 1/100 display mode

**Operation**

The input 0 temperature data is multiplied by 100 and stored in CIO 0030 to CIO 0032, as shown in the following diagram.

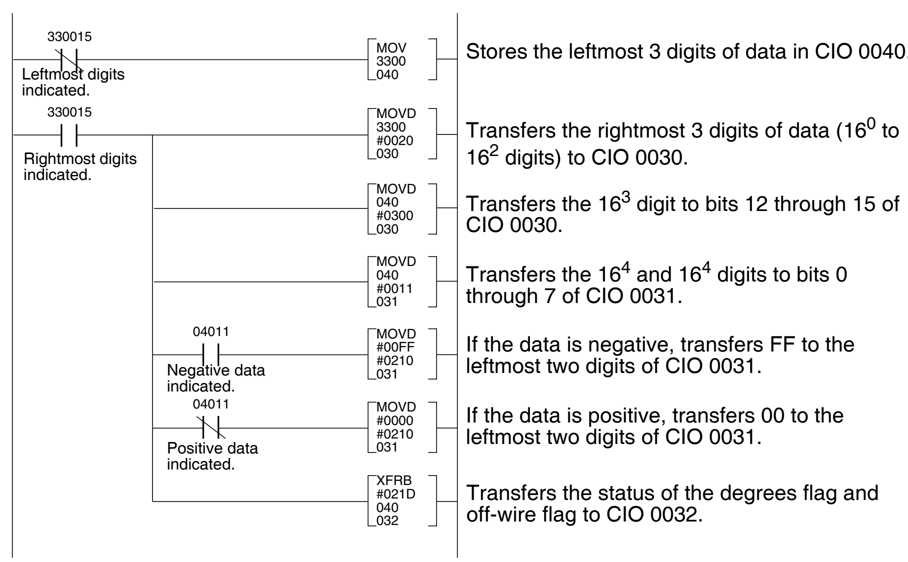
| | 15 to 12 | 11 to 8 | 7 to 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Word 30 | $\times16^3$ | $\times16^2$ | $\times16^1$ | $\times16^0$ | | | |
| Word 31 | $\times16^7$ | $\times16^6$ | $\times16^5$ | $\times16^4$ | | | |
| Word 32 | | | | 0 | Degrees flag | Off-wire flag | 0 |

Degrees flag: 0 for °C, 1 for °F

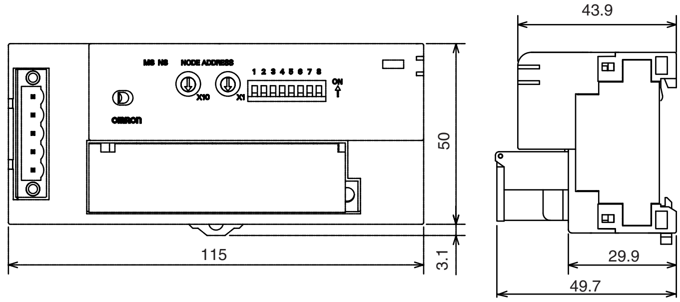
Off-wire flag: 0 for normal, 1 for an off-wire error

The content of CIO 0030 and CIO 0031 is treated as 8-digit hexadecimal data.

**Sample Program**



## Dimensions




## 7-6-3 I/O Data Selection and Allocation

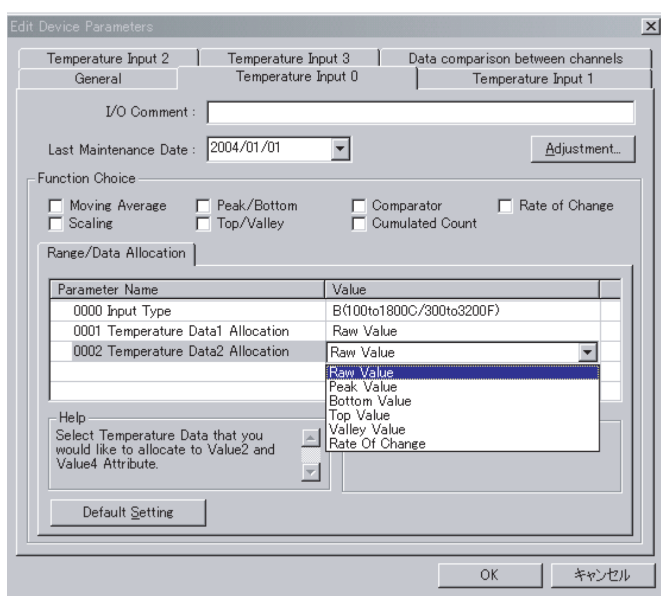
### Selecting Temperature Data

Up to two of the six resulting values can be selected to allocate in the Master (one type each for Temperature Data 1 and Temperature Data 2). Select from analog input value, peak value, bottom value, top value, valley value, and rate of change. The selected data is allocated in the Master individually or in combination with Status Flags. The following methods can be used to select the temperature data.

#### Using the Configurator

***1,2,3...***

1. Double-click the icon of the Slave to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the Tab Page for the input where temperature data is to be selected. From the data on which math operations have been performed, select two types of data from the pull-down menu as Temperature Data 1 and Temperature Data 2.




3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## Allocating I/O Data in the Master

Use one of the following methods to select data for allocating in the Master and then perform remote I/O communications.

*1,2,3...*
1. Allocating only temperature input values (default I/O data) in the Master.
2. Allocating selected I/O data (patterns) in the Master (fixed I/O data combinations).
3. Allocating user-defined I/O data in the Master (user-defined I/O data combinations).

### ■ Allocating Temperature Input Values (Default I/O Data) Only

When using the Temperature Input Terminal's default settings, only the temperature input values are selected as I/O data and allocated in the four words (eight bytes) of the Master's IN Area, as shown in the following diagram.
The data is also be allocated to 4 words when the temperature input value is set to 1/100 display by setting the Slave's DIP switch to DRT1-compatible 1/100 display mode.

| 15 0 |
|---|
| **Temperature input value for Input 0** |
| **Temperature input value for Input 1** |
| **Temperature input value for Input 2** |
| **Temperature input value for Input 3** |

When the temperature input value has been set for "1/100 display mode" with the Configurator, eight words (sixteen bytes) are allocated in the Master's IN Area, as shown in the following diagram.

| 15 0 |
|---|
| **Temperature input value for Input 0** |
| **Temperature input value for Input 0** |
| **Temperature input value for Input 1** |
| **Temperature input value for Input 1** |
| **Temperature input value for Input 2** |
| **Temperature input value for Input 2** |
| **Temperature input value for Input 3** |
| **Temperature input value for Input 3** |

### ■ Allocating Selected I/O Data (Patterns)

The temperature data selected from the data on which math operations have been performed is combined with other data such as Status Flags and allocated in the Master.

Example: Allocating Temperature Data 1 + Top/Valley Detection Timing Flags in the Master.

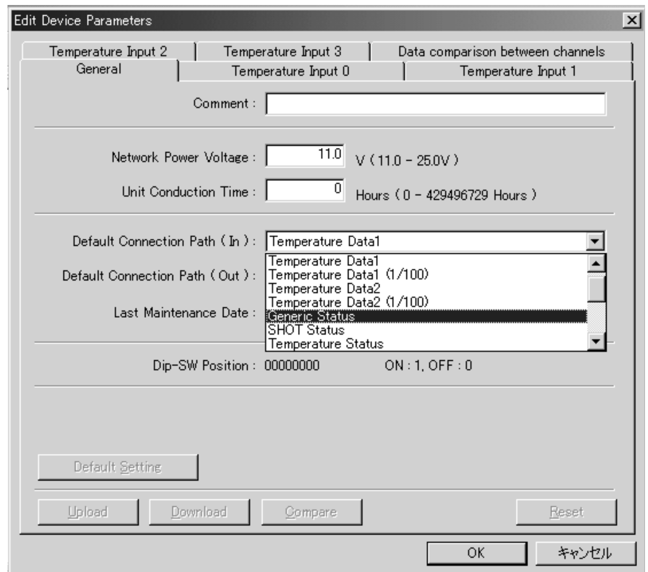
| 15 8 | 7 0 |
|---|---|
| **Temperature Data 1 for Input 0** | |
| **Temperature Data 1 for Input 1** | |
| **Temperature Data 1 for Input 2** | |
| **Temperature Data 1 for Input 3** | |
| **Top Detection Timing Flag** | **Valley Detection Timing Flag** |

The following method can be used to allocate data from the Configurator.

### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the **General** Tab and select the desired I/O data (pattern) from the pull-down menu under the *Default Connection Path (in)* field. In the following example, the Generic Status flags are allocated.




3. Click the **Download** Button and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

#### ■ Allocating User-defined I/O Data (Any I/O Data Combination)

The temperature data selected from the data on which math operations have been performed can be allocated in the Master with other data such as Status Flags, in any combination. The Configurator can be used to allocate two data patterns in the Master with any combination.
This method is supported by CS/CJ-series DeviceNet Master Units only.

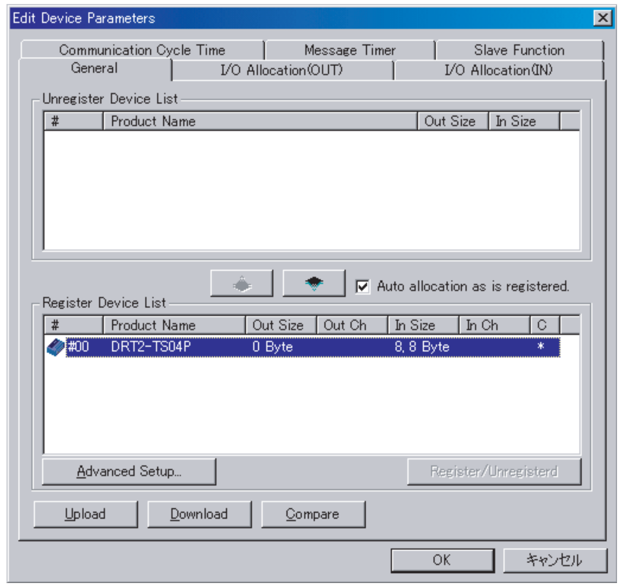
**Note** Priority is given to settings in the Master, so the setting for the Slave's default connection path is not required.

Use the following method to allocate data from the Configurator.

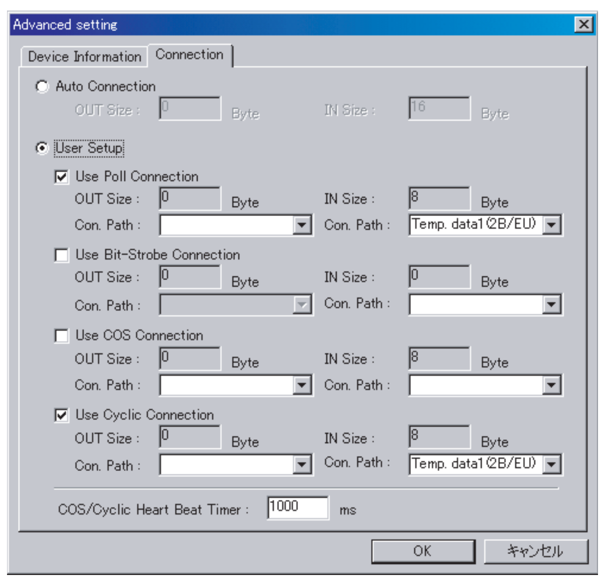
***1,2,3...***

1. Double-click the icon of the Master Unit to which I/O will be allocated and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Master Unit icon and select ***Parameters*** and ***Edit***.)

2. Click the **General** Tab, select the Temperature Input Terminal to be set, and click the **Advanced Setup** Button.

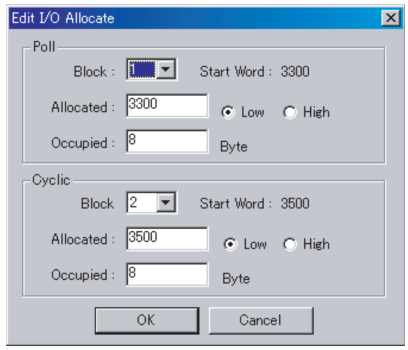



3. Click the **Connection** Tab, and select ***User Setup***. Select ***Use Poll Connection***, and then select the I/O data (pattern) from the pull-down menu for the connection path. In the same way, select ***Use Cyclic Connection***, and then select any I/O data (pattern) from the pull-down menu for the connection path.

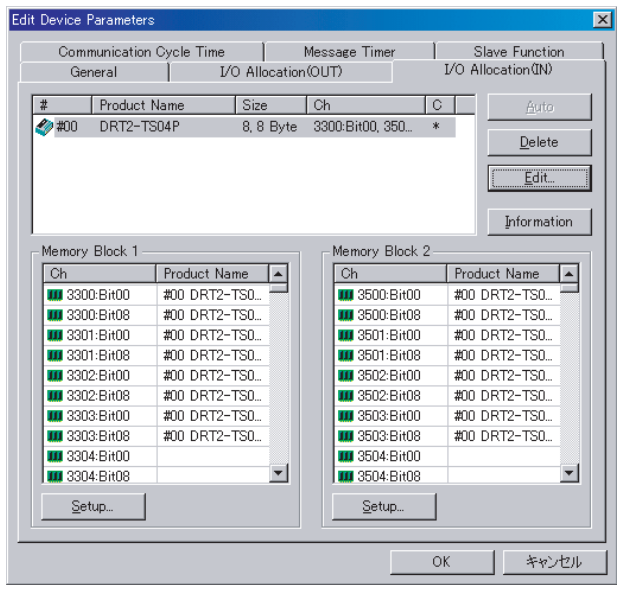



4. Click the **OK** Button and exit the window.
5. Click the **I/O Allocation (IN)** Tab and edit the I/O allocations.
   Select the Smart Slave to be set and click the **Edit** Button to display the Edit I/O Allocate Window.

Set the *Poll* settings to block 1, allocated 3300 (word CIO 3300).
Set the *Cyclic* settings to block 2, allocated 3500 (word CIO 3500).




6. Click the **OK** Button and use the following window to confirm that I/O has been allocated correctly.




7. Click the **OK** Button, return to the **General** Tab, and click the **Download** Button.

## I/O Data

**Temperature Data 1 (Instance 104 or 108)**

Temperature Data 1 is used to monitor the temperature input values. The temperature input value is allocated as the default setting, but any one of temperature input value, peak value, bottom value, top value, valley value or rate of change can be selected as allocation data.

**Note** The comparator function can be used for the data allocated in Temperature Data 1.

The following tables show the data format used for allocating data in the Master. Data is allocated as two’s complements.

**Normal Display (Instance 104)**

| 15 | 0 |
|---|---|
| Temperature Data 1 for Input 0 | |
| Temperature Data 1 for Input 1 | |
| Temperature Data 1 for Input 2 | |
| Temperature Data 1 for Input 3 | |

**1/100 Display Mode (Instance 108)**

| 15 | 0 |
|---|---|
| Temperature Data 1 for Input 0 | |
| Temperature Data 1 for Input 0 | |
| Temperature Data 1 for Input 1 | |
| Temperature Data 1 for Input 1 | |
| Temperature Data 1 for Input 2 | |
| Temperature Data 1 for Input 2 | |
| Temperature Data 1 for Input 3 | |
| Temperature Data 1 for Input 3 | |

**Temperature Data 2 (Instance 114 or 118)**

Temperature Data 2 is used to monitor other temperature data in addition to that in Temperature Data 1. Select one type of following data other than that allocated for Temperature Data 1: Temperature input value, peak value, bottom value, top value, valley value, or rate of change.

**Note** The "Data Comparison between Channels" function, which detects temperature differences between different input channels, can be used with the values allocated as Temperature Data 2.

The following tables show the data format used for allocating data in the Master. Data is allocated as two's complements.

**Normal Display (Instance 114)**

| 15 | 0 |
|---|---|
| Temperature Data 2 for Input 0 | |
| Temperature Data 2 for Input 1 | |
| Temperature Data 2 for Input 2 | |
| Temperature Data 2 for Input 3 | |

**Note** When the DRT1-compatible 1/100 display mode is being used for 1/100 display, only 4 words (8 bytes) are occupied in the Master as well.

**1/100 Display Mode (Instance 118)**

| 15 | 0 |
|---|---|
| Temperature Data 2 for Input 0 | |
| Temperature Data 2 for Input 0 | |
| Temperature Data 2 for Input 1 | |
| Temperature Data 2 for Input 1 | |
| Temperature Data 2 for Input 2 | |
| Temperature Data 2 for Input 2 | |
| Temperature Data 2 for Input 3 | |
| Temperature Data 2 for Input 3 | |

**Generic Status Flags (Instance 121)**

The Generic Status Flags are used to monitor flags that indicate maintenance information (Network Power Voltage Monitor Flag, Unit Conduction Time Monitor Flag, and Temperature Data Cumulative Counter Flag). The following data format is used for allocating flags in the Master (1 byte).

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The details of each bit are shown in the following table.

| Bit | Abbrevia-tion | Name | Details |
|---|---|---|---|
| 0 | --- | --- | Reserved. (Always 0.) |
| 1 | --- | --- | Reserved. (Always 0.) |
| 2 | NPW | Network Power Voltage Monitor Flag | Turns ON when the Network power level drops below the set monitor value. |
| 3 | RHW | Unit Conduction Time Monitor Flag | Turns ON when the Unit ON time exceeds the set monitor value. |
| 4 | CCW | Temperature Data Cumulative Counter Flag | Turns ON when any of the cumulated analog values exceeds the set monitor value. |
| 5 | MRF | Unit Error Flag | Turns ON when analog conversion stops due to a Unit error. |
| 6 | --- | --- | Reserved. (Always 0.) |
| 7 | --- | Cold Junction Compensator Off-wire Flag | Turns ON when the cold junction compensator is broken or off-wire.<br>(DRT2-TS04T only) |

The following format is used when Generic Status Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15 8 | 7 0 |
|---|---|---|
| +0 | | Generic Status Flags |

**Top/Valley Detection Timing Flags (Instance 122)**

These flags turn ON for the one-shot time when detecting the top or valley for the top/valley hold function.

These flags are used to time reading the values held as the top and valley values at the Master. The following data format is used when these flags are allocated in the Master (2 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |

The details of each byte are shown in the following table.

| Byte | Abbreviation | Name | Details |
|---|---|---|---|
| +0 | V_STx | Valley Detection Timing Flag | Turns ON when a valley is detected by the valley hold function and then turns OFF after the one-shot time has elapsed. |
| +1 | T_STx | Top Detection Timing Flag | Turns ON when a top is detected by the top hold function and then turns OFF after the one-shot time has elapsed. |

**Note** The one-shot time can be changed. For details, refer to the one-shot time settings for the top/valley hold function.

The following format is used when the Top/Valley Detection Timing Flags are allocated, starting from the rightmost byte of the Master

| Word | 15 — 12 | 11 — 8 | 7 — 4 | 3 — 0 |
|---|---|---|---|---|
| +0 | | Top Detection Timing Flag | | Valley Detection Timing Flag |

**Analog Status Flags (Instance 134)**

The Analog Status Flags include allocations for the Comparator Result Flag, the Top/Valley Detection Timing Flags, and the Off-wire Detection Flags. These flags are used for detection and monitoring.

The data format used for each byte when these flags are allocated in the Master is shown below (4 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|---|---|---|---|---|---|---|---|---|---|
| +0 | BW0 | T_ST0 | V_ST0 | HH | H | PS0 | L | LL | Input 0 |
| +1 | BW1 | T_ST1 | V_ST1 | HH | H | PS1 | L | LL | Input 1 |
| +2 | BW2 | T_ST2 | V_ST2 | HH | H | PS2 | L | LL | Input 2 |
| +3 | BW3 | T_ST3 | V_ST3 | HH | H | PS3 | L | LL | Input 3 |

The details for each bit are shown in the following table.

| Bit | Abbreviation | Name | | Details |
|---|---|---|---|---|
| 0 | LLx | Comparator result | Low Low Limit Alarm Flag | Turns ON when the value of data allocated in Temperature Data 1 drops below the Low Low Limit alarm setting. |
| 1 | Lx | | Low Limit Alarm Flag | Turns ON when the value of data allocated in Temperature Data 1 drops below the Low Limit alarm setting. |
| 2 | PSx | | Normal Flag (pass signal) | Turns ON when none of the alarms (High High Limit, High Limit, Low Low Limit, and Low Limit) have been output. |
| 3 | Hx | | High Limit Alarm Flag | Turns ON when the value of data allocated in Temperature Data 1 exceeds the High Limit alarm setting. |
| 4 | HHx | | High High Limit Alarm Flag | Turns ON when the value of data allocated in Temperature Data 1 exceeds the High High Limit alarm setting. |
| 5 | V_STx | Top/valley detection timing | Valley Detection Timing Flag | Used with the valley hold function.<br>Turns ON when a valley is detected, and turns OFF after the one-shot time has lapsed. |
| 6 | T_STx | | Top Detection Timing Flag | Used with the top hold function.<br>Turns ON when a top is detected, and turns OFF after the one-shot time has lapsed. |
| 7 | BWx | Off-wire Detection Flag | | Turns ON when a disconnection is detected. |

The following format is used when Analog Status Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15 … 8 | 7 … 0 |
|---|---|---|
| +0 | For Input 1 | For Input 0 |
| +1 | For Input 3 | For Input 2 |

**Temperature Data 1 + Temperature Data 2 (Instance 144 or 148)**

This data pattern consists of Temperature Data 1 followed by Temperature Data 2 and is allocated in the Master using the following data format. Negative data values are given as two's complements

**Normal Display (Instance 144)**

| Word | 15 … 0 |
|---|---|
| +0 | Temperature Data 1 for Input 0 |
| +1 | Temperature Data 1 for Input 1 |
| +2 | Temperature Data 1 for Input 2 |
| +3 | Temperature Data 1 for Input 3 |
| +4 | Temperature Data 2 for Input 0 |
| +5 | Temperature Data 2 for Input 1 |
| +6 | Temperature Data 2 for Input 2 |
| +7 | Temperature Data 2 for Input 3 |

**1/100 Display Mode (Instance 148)**

| Word | 15 … 0 |
|---|---|
| +0 | Temperature Data 1 for Input 0 |
| +1 | Temperature Data 1 for Input 0 |
| +2 | Temperature Data 1 for Input 1 |
| +3 | Temperature Data 1 for Input 1 |
| +4 | Temperature Data 1 for Input 2 |
| +5 | Temperature Data 1 for Input 2 |
| +6 | Temperature Data 1 for Input 3 |
| +7 | Temperature Data 1 for Input 3 |
| +8 | Temperature Data 2 for Input 0 |
| +9 | Temperature Data 2 for Input 0 |
| +10 | Temperature Data 2 for Input 1 |
| +11 | Temperature Data 2 for Input 1 |
| +12 | Temperature Data 2 for Input 2 |
| +13 | Temperature Data 2 for Input 2 |
| +14 | Temperature Data 2 for Input 3 |
| +15 | Temperature Data 2 for Input 3 |

**Top/Valley Detection Timing Flags + Generic Status Flags (Instance 151)**

This data pattern consists of the Top/Valley Detection Timing Flags followed by Generic Status Flags and is allocated in the Master using the following data format, shown by byte (3 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |
| +2 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | | Top Detection Timing Flags | | Valley Detection Timing Flags |
| +1 | | | Generic Status Flags | |

**Analog Status Flags + Generic Status Flags (Instance 164)**

This data pattern consists of Analog Status Flags followed by Generic Status Flags and is allocated in the Master using the following data format, shown by byte (5 bytes).

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|---|---|---|---|---|---|---|---|---|---|
| +0 | BD0 | T_ST0 | V_ST0 | HH | H | PS0 | LL | L | Input 0 |
| +1 | BD1 | T_ST1 | V_ST1 | HH | H | PS1 | LL | L | Input 1 |
| +2 | BD2 | T_ST2 | V_ST2 | HH | H | PS2 | LL | L | Input 2 |
| +3 | BD3 | T_ST3 | V_ST3 | HH | H | PS3 | LL | L | Input 3 |
| +4 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 8 | 7 0 |
|---|---|---|
| +0 | For Input 1 | For Input 0 |
| +1 | For Input 3 | For Input 2 |
| +2 | | Generic Status Flags |

**Temperature Data 1 + Top/Valley Detection Timing Flags (Instance174 or 178)**

This data pattern consists of Temperature Data 1 followed by the Top/Valley Detection Timing Flags and is allocated in the Master using the following data format (10 bytes).

**Normal Display (Instance 174)**

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | | | | | |
| +1 | | | | | | | | |
| +2 | Temperature Data 1 for Input 1 | | | | | | | |
| +3 | | | | | | | | |
| +4 | Temperature Data 1 for Input 2 | | | | | | | |
| +5 | | | | | | | | |
| +6 | Temperature Data 1 for Input 3 | | | | | | | |
| +7 | | | | | | | | |
| +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | |
| +1 | Temperature Data 1 for Input 1 | | | |
| +2 | Temperature Data 1 for Input 2 | | | |
| +3 | Temperature Data 1 for Input 3 | | | |
| +4 | | Top Detection Timing Flags | | Valley Detection Timing Flags |

**1/100 Display (Instance 178)**

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | | | | | |
| +1 | | | | | | | | |
| +2 | Temperature Data 1 for Input 0 | | | | | | | |
| +3 | | | | | | | | |
| +4 | Temperature Data 1 for Input 1 | | | | | | | |
| +5 | | | | | | | | |
| +6 | Temperature Data 1 for Input 1 | | | | | | | |
| +7 | | | | | | | | |
| +8 | Temperature Data 1 for Input 2 | | | | | | | |
| +9 | | | | | | | | |
| +10 | Temperature Data 1 for Input 2 | | | | | | | |
| +11 | | | | | | | | |
| +12 | Temperature Data 1 for Input 3 | | | | | | | |
| +13 | | | | | | | | |
| +14 | Temperature Data 1 for Input 3 | | | | | | | |
| +15 | | | | | | | | |
| +16 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +17 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | |
| +1 | Temperature Data 1 for Input 0 | | | |
| +2 | Temperature Data 1 for Input 1 | | | |
| +3 | Temperature Data 1 for Input 1 | | | |
| +4 | Temperature Data 1 for Input 2 | | | |
| +5 | Temperature Data 1 for Input 2 | | | |
| +6 | Temperature Data 1 for Input 3 | | | |
| +7 | Temperature Data 1 for Input 3 | | | |
| +8 | | Top Detection Timing Flags | | Valley Detection Timing Flags |

**Temperature Data 1 + Top/Valley Detection Timing Flags + Generic Status Flags (Instance 184 or 188)**

This data pattern consists of Analog Data 1 followed by the Top/Valley Detection Timing Flags and then the Generic Status Flags and is allocated in the Master using the following data format, shown by byte (11 bytes).

Normal Display (Instance 184)

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0<br>+1 | Temperature Data 1 for Input 0 | | | | | | | |
| +2<br>+3 | Temperature Data 1 for Input 1 | | | | | | | |
| +4<br>+5 | Temperature Data 1 for Input 2 | | | | | | | |
| +6<br>+7 | Temperature Data 1 for Input 3 | | | | | | | |
| +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |
| +10 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The following format is used when this data pattern is allocated starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | |
| +1 | Temperature Data 1 for Input 1 | | | |
| +2 | Temperature Data 1 for Input 2 | | | |
| +3 | Temperature Data 1 for Input 3 | | | |
| +4 | | Top Detection Timing Flags | | Valley Detection Timing Flags |
| +5 | | | Generic Status Flags | |

1/100 Display (Instance 188)

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0<br>+1 | Temperature Data 1 for Input 0 | | | | | | | |
| +2<br>+3 | Temperature Data 1 for Input 0 | | | | | | | |
| +4<br>+5 | Temperature Data 1 for Input 1 | | | | | | | |
| +6<br>+7 | Temperature Data 1 for Input 1 | | | | | | | |
| +8<br>+9 | Temperature Data 1 for Input 2 | | | | | | | |
| +10<br>+11 | Temperature Data 1 for Input 2 | | | | | | | |
| +12<br>+13 | Temperature Data 1 for Input 3 | | | | | | | |
| +14<br>+15 | Temperature Data 1 for Input 3 | | | | | | | |
| +16 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 |
| +17 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 |
| +18 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 |

The following format is used when this data pattern is allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | Temperature Data 1 for Input 0 | | | |
| +1 | Temperature Data 1 for Input 0 | | | |
| +2 | Temperature Data 1 for Input 1 | | | |
| +3 | Temperature Data 1 for Input 1 | | | |
| +4 | Temperature Data 1 for Input 2 | | | |
| +5 | Temperature Data 1 for Input 2 | | | |
| +6 | Temperature Data 1 for Input 3 | | | |
| +7 | Temperature Data 1 for Input 3 | | | |
| +8 | | Top Detection Timing Flags | | Valley Detection Timing Flags |
| +9 | | | Generic Status Flags | |

**Hold Flags (Output) (Instance 190)**

Hold Flags are used with the peak/bottom hold and top/valley hold functions. The Hold Flags are used to control the hold execution timing from the Master and are allocated in the Master using the following data format (1 byte).

**Note** A delay may occur between when the Master's power is turned ON until notification of the Hold Flag status is sent to the Slave.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | | | | | **HD3** | **HD2** | **HD1** | **HD0** |

The details for each bit are shown in the following table.

| Bit | Abbreviation | Name | Details |
|---|---|---|---|
| **0** | **HD0** | Hold Flag for Input 0 | The hold function is performed for Temperature Input 0 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **1** | **HD1** | Hold Flag for Input 1 | The hold function is performed for Temperature Input 1 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **2** | **HD2** | Hold Flag for Input 2 | The hold function is performed for Temperature Input 2 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |
| **3** | **HD3** | Hold Flag for Input 3 | The hold function is performed for Temperature Input 3 while this flag is ON. The hold function stops and the last value is held when the flag goes OFF. |

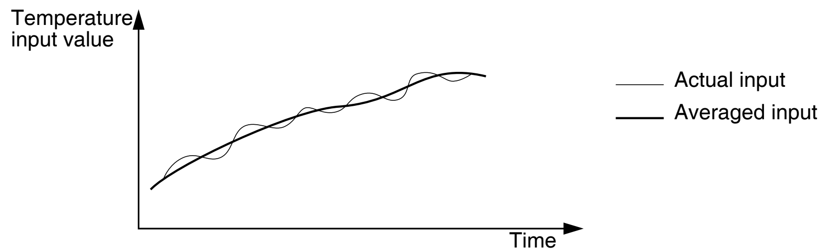
The following format is used when the Hold Flags are allocated, starting from the rightmost byte of the Master.

| Word | 15 | 8 | 7 | 0 |
|---|---|---|---|---|
| +0 | | | **Hold Flags** | |

## 7-6-4 Functions and Settings

### Moving Average Processing

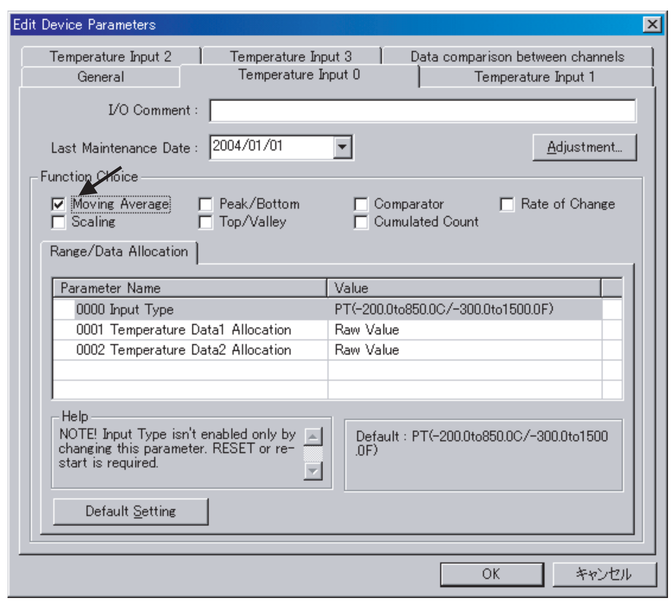
This function calculates the average value (moving average) of the previous eight inputs, and uses the resulting value as conversion data. When the input value fluctuates frequently, averaging can be used to produce a stable input value, as shown in the following diagram.




**Setting Using the DeviceNet Configurator**

*1,2,3...*

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where moving average processing is to be performed, and select ***Moving Average*** under the *Function Choice* heading.



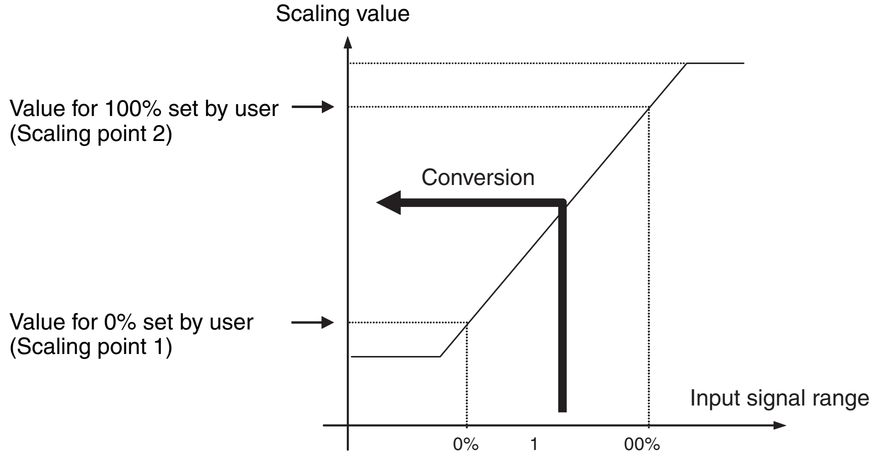

3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

### Scaling

Scaling can be used to convert the temperature input values (measured values) to display values in the scale required by the user. Scaling also eliminates the need for ladder programming in the Master to perform these basic math operations.

In order to scale the temperature input values (measured values) to the scale required by the user, use the Configurator to set the conversion values

(–28,000 to 28,000) for two points in the scale (the 100% value and 0% value).

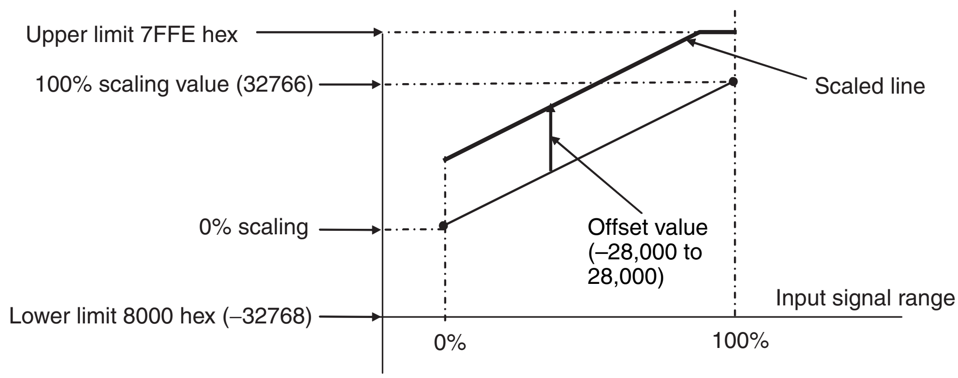



**Note**
1. The default values are 0 and 28,000.
2. Reverse scaling, where the 0% scaling value is higher than the 100% scaling value, is also supported.

**Offset Compensation**

The scaling function is equipped with offset compensation, which can compensate for any error that occurs during scaling. The offset amount is added to the scaled line as shown in the following diagram. The offset (error) value can be input between –28,000 to 28,000, but make sure that underflow or overflow does not occur. The High Limit is 7FFE hex and the Low Limit is 8000 hex.

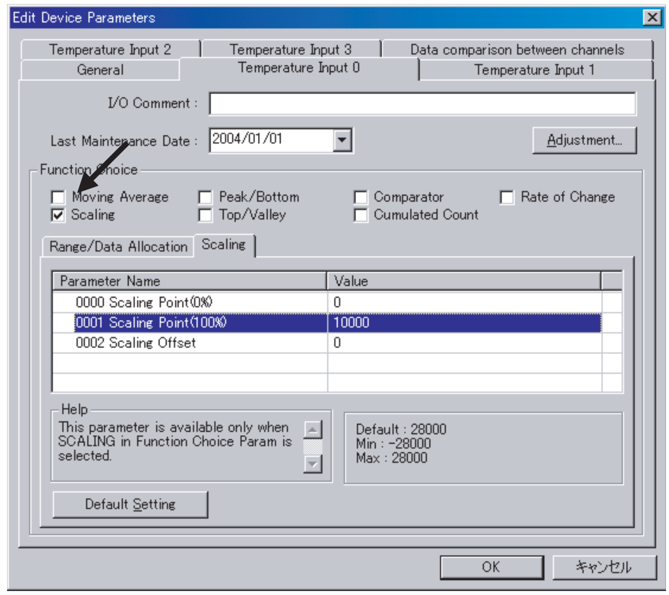
**Note** The offset value can be set even when using default scaling.



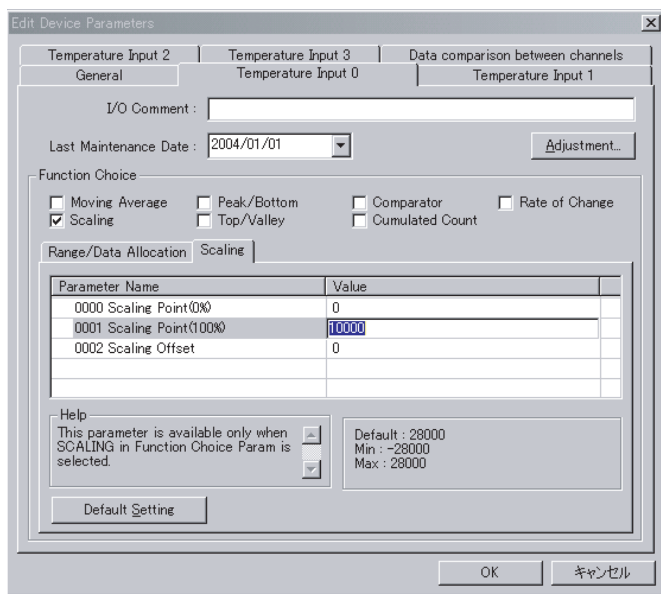

### Setting Using the DeviceNet Configurator

*1,2,3...*
1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

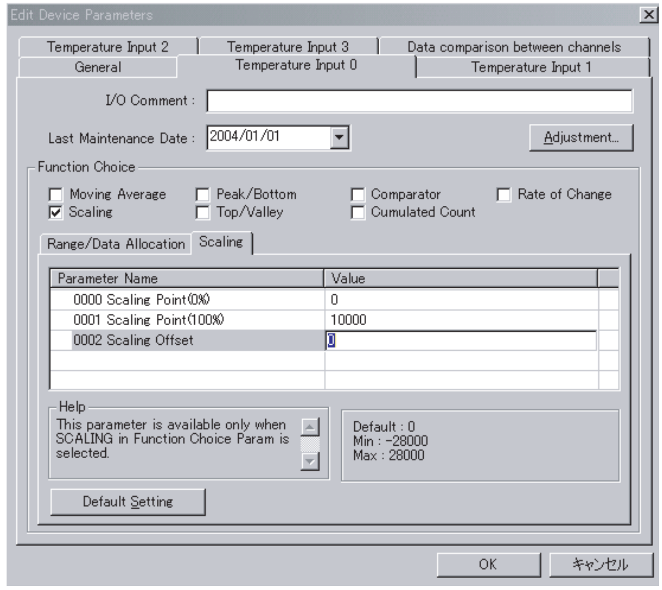
2. Select the Tab Page for the input where scaling is to be performed, and select ***Scaling*** under the *Function Choice* heading.




3. Set the 0% value in the *Scaling point 1* field, and set the 100% value in the *Scaling point 2* field.



4. When using the offset compensation option, set the offset value in the *Scaling Offset* field.

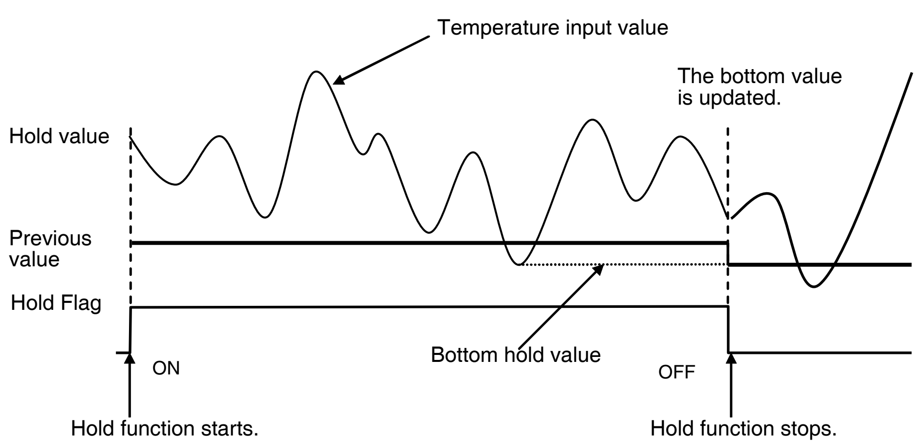



5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

## Peak/Bottom Hold

Peak/bottom hold is used to hold the maximum (peak) value or minimum (bottom) value of the temperature input value. When the Hold Flag (output) allocated in the OUT Area turns ON, the hold function starts, searching for the peak or bottom value until the Hold Flag turns OFF. (The peak/bottom value is refreshed when the Hold Flag turns OFF.) The comparator function can be used to compare the peak or bottom values allocated as temperature data 1. (Refer to details on the comparator function.)

**Example of Bottom Hold**

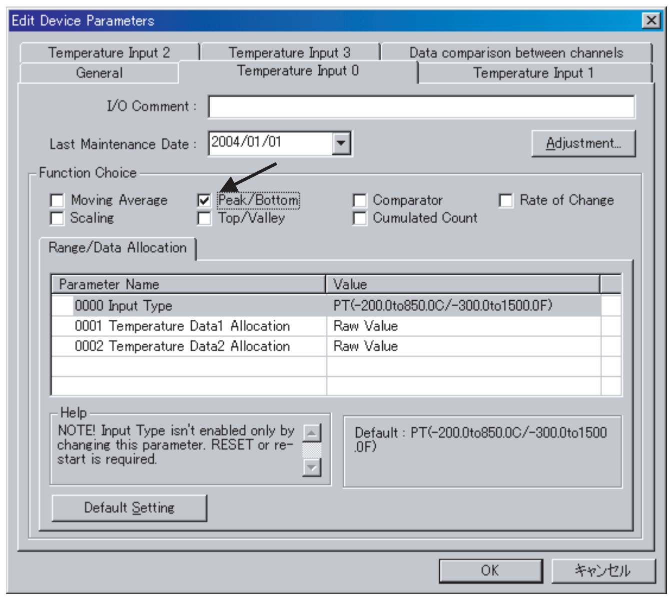



**Note** A delay in network transmission time will occur from the time the Hold Flag turns ON (or OFF) in the Master's ladder program until notification of the flag's status is actually sent to the Slave. Therefore, even when the Hold Flag is ON, the first temperature data transmitted to the Master when the CPU Unit power is turned ON may be the data from when the Hold Flag was OFF. To collect peak/bottom hold data using the Hold Flag at the Master, configure a ladder program that considers the transmission delay when the Hold Flag is turned ON, then enables the peak/bottom hold values after a fixed time interval.

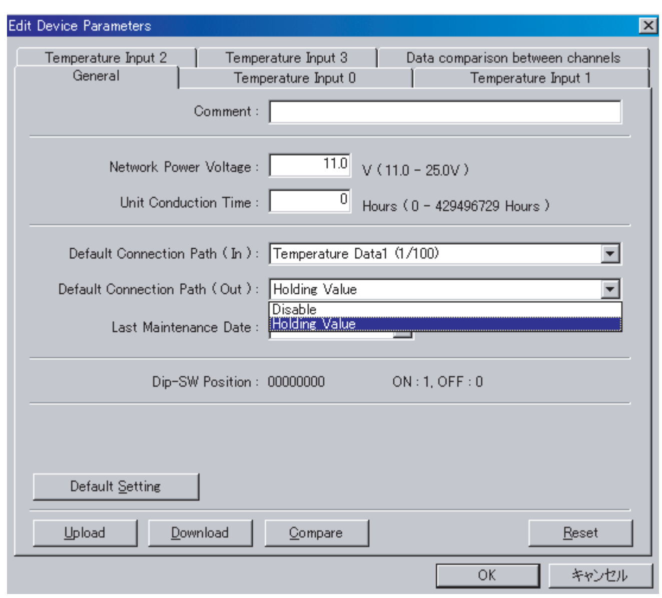
### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where peak/bottom hold is to be set, and select ***Peak/Bottom Hold*** under the *Function Choice* heading.




3. To allocate the Hold Flags (output) in the default connection path, click the **General** Tab and select ***Holding Value*** from the pull-down menu in the *Default Connection Path (Out)* field.




4. Click the **Download** Button and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

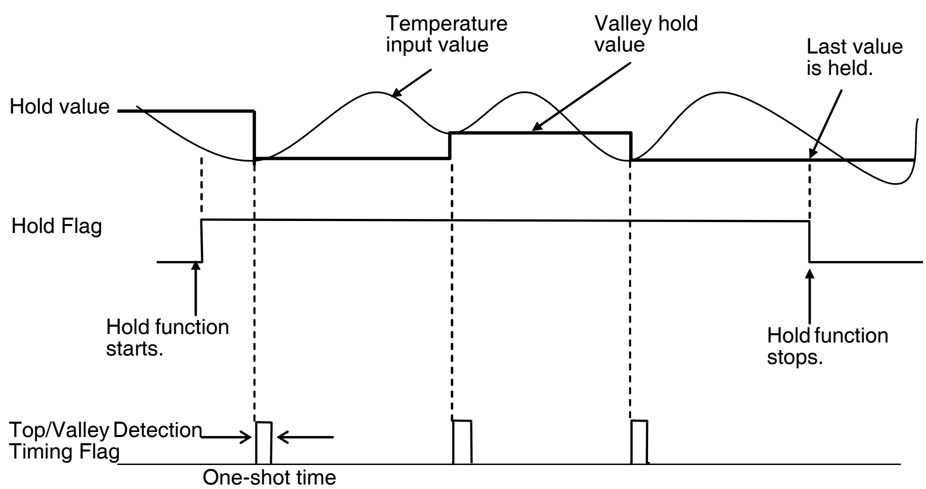
## Top/Valley Hold

Top/valley hold is used to hold the top and valley values of the temperature input value.

Temperature values that fluctuate more than twice the hysteresis value are monitored, and the top or valley values are held. The top or valley value is allocated along with the Top/Valley Detection Timing Flags, which can be used to check the hold timing.

When the Hold Flag (output) allocated in the OUT Area turns ON, the hold function starts, refreshing the top or valley value until the Hold Flag turns OFF. (The last value is held when the Hold Flag turns OFF, but the next time the Hold Flag turns ON, the hold value is initialized as soon as a top or valley occurs.) The comparator can be used to compare the top or valley value allocated as temperature data 1. (Refer to details on the comparator function.)

**Example of Valley Hold**




**Note**

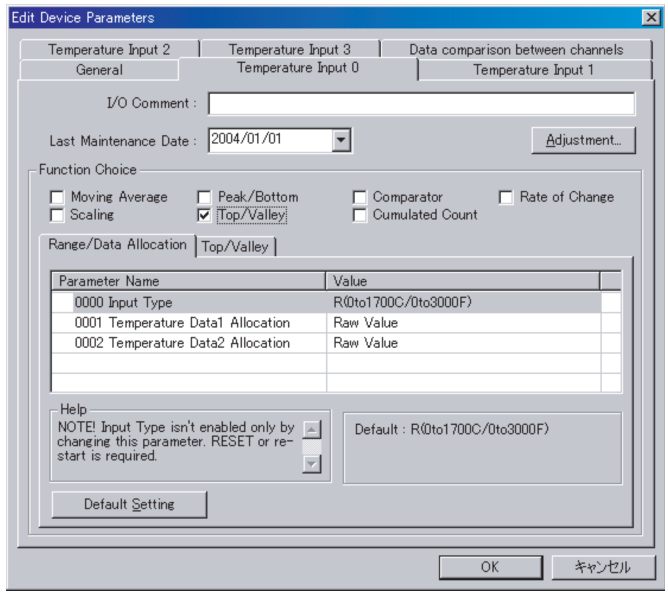
1. A delay in network transmission time will occur from the time the Hold Flag turns ON (or OFF) in the Master's ladder program until notification of the flag's status is actually sent to the Slave. Therefore, even when the Hold Flag is ON, the first temperature data transmitted to the Master when the CPU Unit power is turned ON may be the data from when the Hold Flag was OFF. To collect top/valley hold data using the Hold Flag at the Master, configure a ladder program which considers the transmission delay time when the Hold Flag is turned ON, then enables the top/valley hold values after a fixed time interval.
2. The time that the Top/Valley Detection Timing Flags are ON can be adjusted by setting the one-shot time. Use the Configurator to set the one-shot time (the setting range is 1 to 65,535 ms).
3. If the Hold Flag turns OFF during the time the Top/Valley Detection Timing Flag is set to be ON, both flags will turn OFF simultaneously.

### Setting Using the DeviceNet Configurator

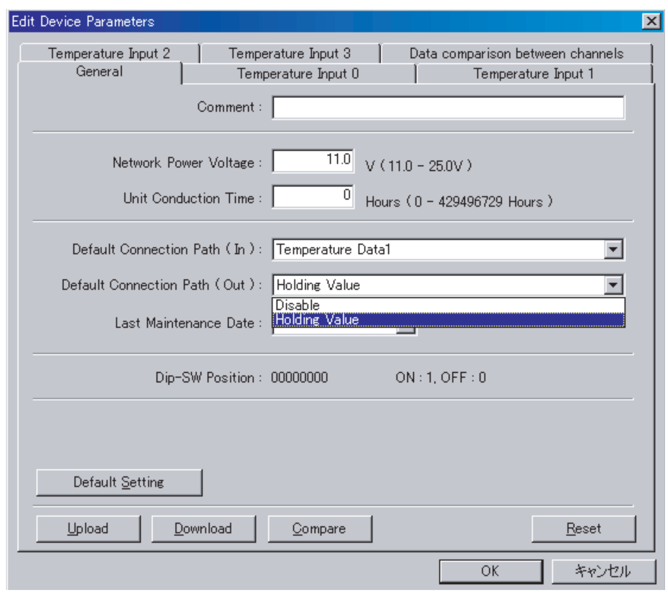
*1,2,3...*

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Select the Tab Page for the input where top/valley hold is to be set, and select ***Top/Valley*** under the *Function Choice* heading.




3. To allocate the Hold Flag (output) in the default connection path, click the **General** Tab, and select ***Holding Value*** from the pull-down menu in the *Default Connection Path (Out)* field.

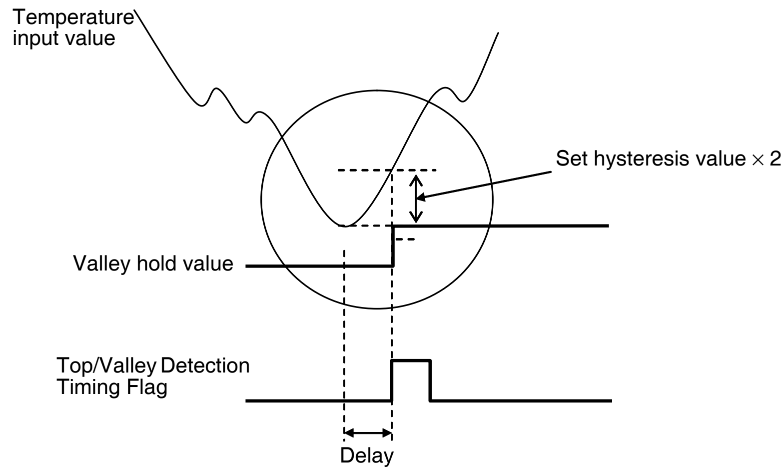



4. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.

**Hysteresis Setting**

The hysteresis value can be set using the Configurator to prevent detection of top or valley values that occur due to minor fluctuations in the temperature input value. This will cause the start of data holding to be delayed after the actual top or valley value occurs, as shown in the following diagram.

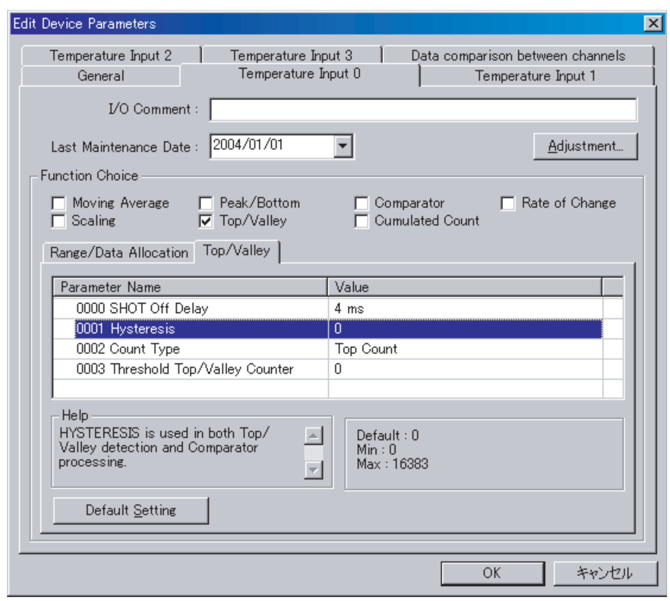
## Timing for Setting Data




## Setting Hysteresis Using the DeviceNet Configurator

***1,2,3...***

1. Input the value for hysteresis in the *Hysteresis* field in the **Top/Valley** Tab under the *Function Choice* heading.

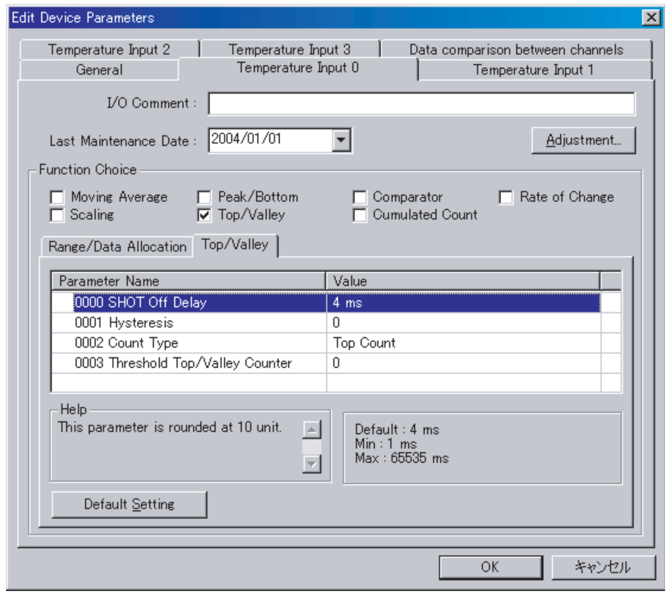



2. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
3. Click the **OK** Button and exit the window.

**Note** The hysteresis value set for the top/valley hold function is also used by the comparator function.

### One-shot Time Setting

***1,2,3...*** 1. Input the desired value in the *SHOT Off Delay* field of the **Top/Valley** Tab under the *Function Choice* heading.



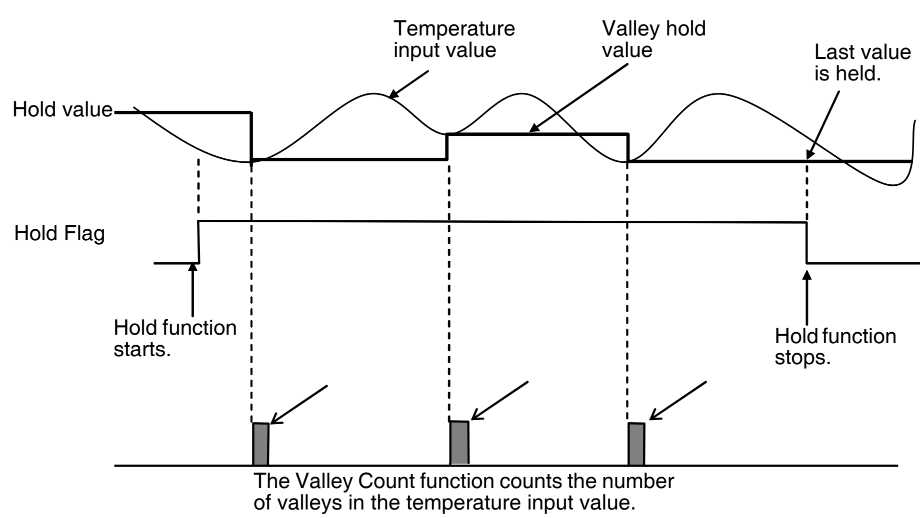

2. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
3. Click the **OK** Button and exit the window.

## Top/Valley Counter Function

This function counts the number of temperature tops or valleys in devices or applications that have repetitive temperature rises (or drops). A threshold value can be set for the counter to indicate when preventative maintenance is required for the Unit or sensors.

The Over Threshold status can be read in the Maintenance Information Window or via an explicit message.

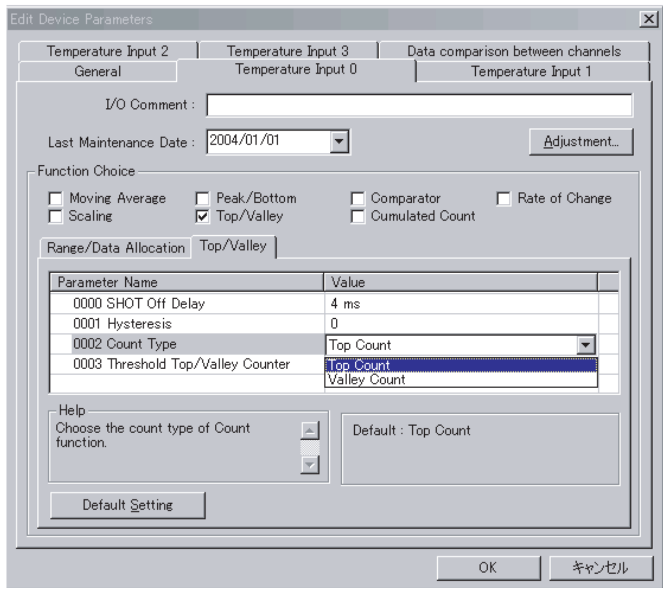
### Valley Counter Operation



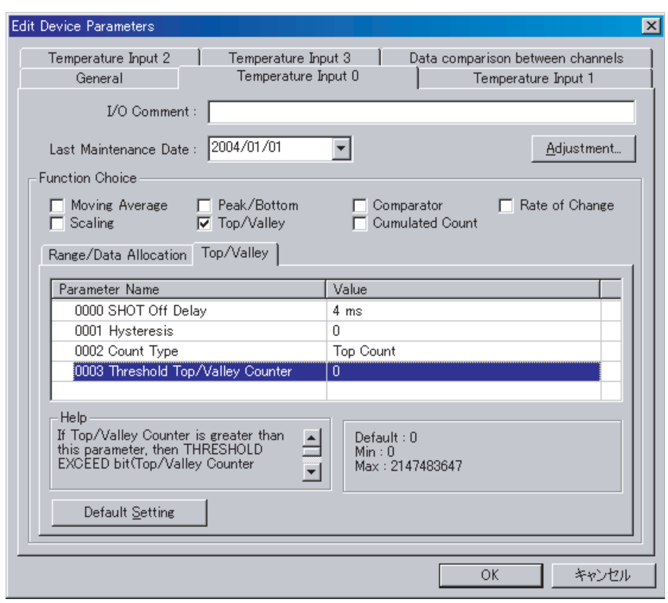
### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where top/valley counter is to be set, and select ***Top/Valley*** under the *Function Choice* heading.
3. Select the **Top/Valley** Tab and select either ***Top Count*** or ***Valley Count*** from the pull-down menu in the *Count Type* field.



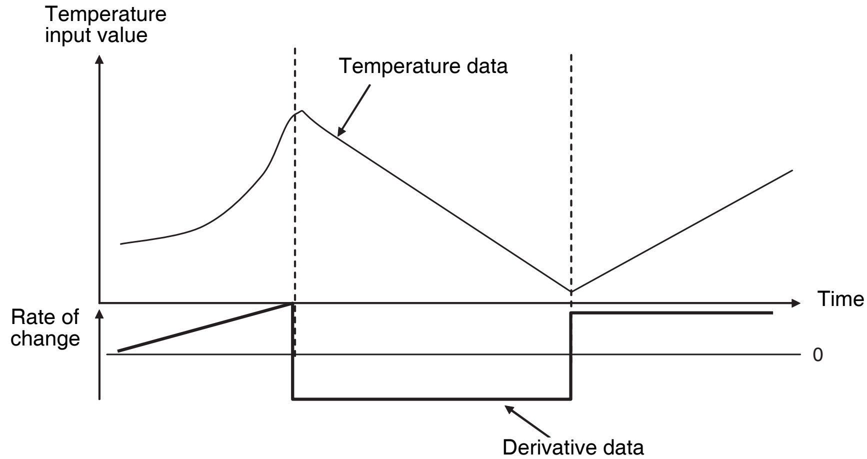

4. A threshold count value can be set in the *Threshold Top/Valley Counter* field.



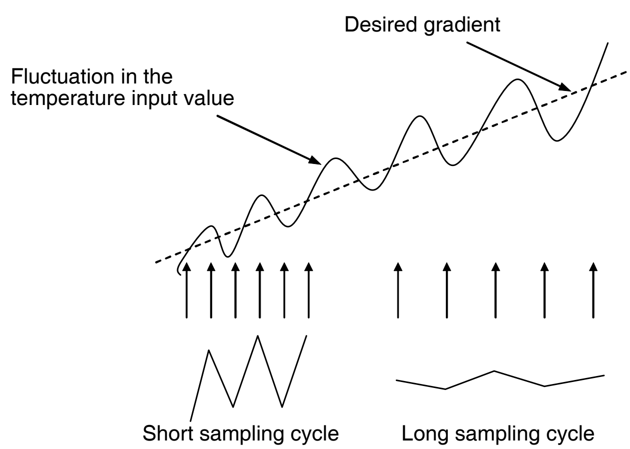

5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

## Rate of Change Calculation

The rate of change can be obtained for each sampling cycle set for the temperature input data. This function calculates the difference between each set sampling cycle and value obtained in the previous cycle. The sampling cycle can be set between 250 ms and 65,500 ms in 250-ms increments. The default setting for the sampling cycle is 250 ms.




**Note** If the sampling cycle is set to a small value, the rate of change will be sensitive to small changes. If the temperature data is subject to minute fluctuations, and the sampling cycle is shorter than the cycle of fluctuation, the fluctuation will be regarded as the rate of change. To prevent this occurring, use moving average processing, which will set a longer sampling cycle.

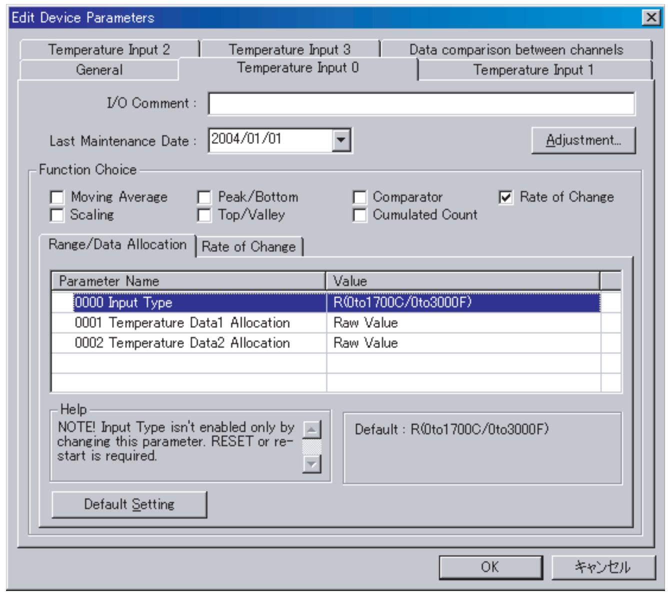



### Setting Using the DeviceNet Configurator

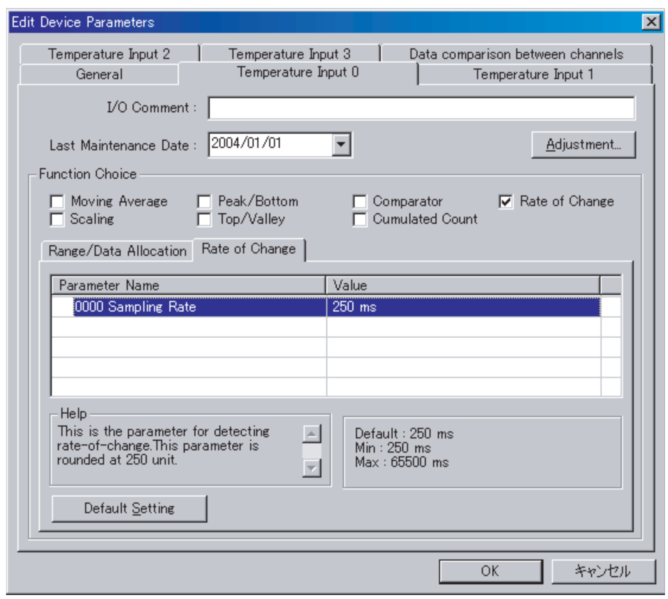
***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Select the Tab Page for the input where rate of change is to be set, and select ***Rate of Change*** under the *Function Choice* heading.




3. To set the sampling cycle, click the **Rate of Change** Tab and input the desired value for the sampling cycle in the *Sampling Rate* field.



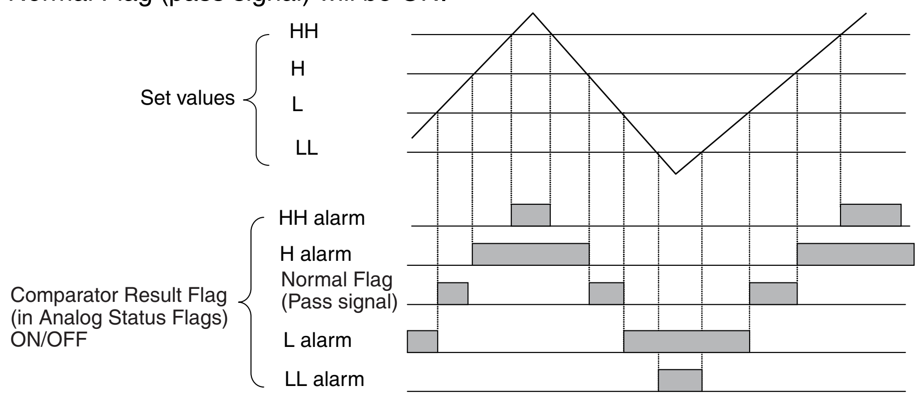

4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.

## Comparator

When the High High Limit, High Limit, Low Low Limit, and Low Limit are set in the Slave, a status flag will be turned ON when a value exceeds the setting range. The four set values are High High Limit (HH), High Limit (H), Low Low Limit (LL), and Low Limit (L), and the values are compared with those in Temperature Data 1. (The comparator function cannot be used with Temperature Data 2.)

The setting range is –31,500 to 415,000.

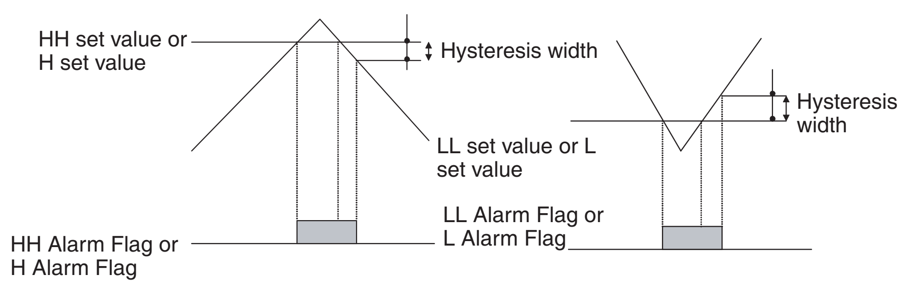
When each of these values is exceeded, the Comparator Result Flag in the area for Analog Status Flags is turned ON. If an alarm has not occurred, the Normal Flag (pass signal) will be ON.




**Note** When the temperature input value changes faster than the conversion cycle, the status may go from a Low Limit alarm directly to a High Limit alarm without having the Normal Flag (pass signal) go ON in between. Configure ladder programs to prevent this from occurring.

### Setting Hysteresis

The Comparator Result Flag turns OFF when the value is lower than the hysteresis width (H or HH alarm occurs) or exceeds it (L or LL alarm occurs), as shown in the following diagram. If the analog value fluctuates around the threshold, and the flag repeatedly turns ON or OFF, setting hysteresis will stabilize the flag operation. The setting range is 0 to 16,383.

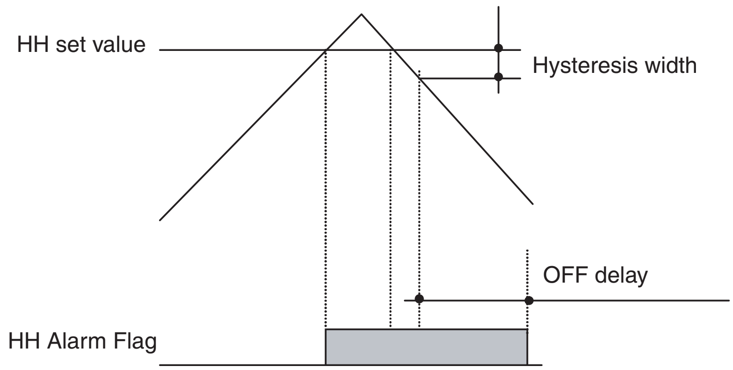



**Note** When setting the hysteresis value, adjust for each input's decimal point position or the 1/100 display mode if the 1/100 display mode is being used. Always correct the hysteresis value after changing the display mode setting or replacing the sensor with a sensor that has a different decimal point position.
Example hysteresis value settings for 10°C:

- R thermocouple (normal display) setting: 0010 decimal
- T thermocouple (normal display) setting: 0100 decimal
- Setting for any input with 1/100 display: 1000 decimal

**OFF Delay**

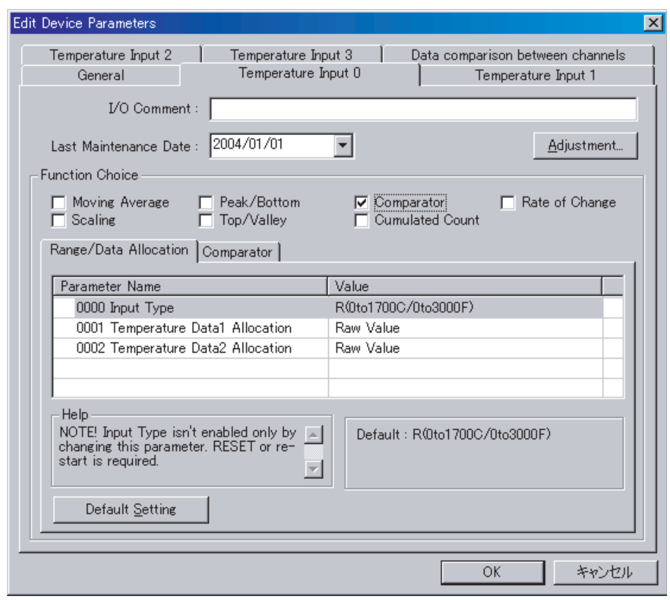
The time until the Comparator Result Flag turns OFF can be extended. For example, even if the Flag is ON momentarily, the OFF delay can be set so that the Master can receive notification of the Flag's status.



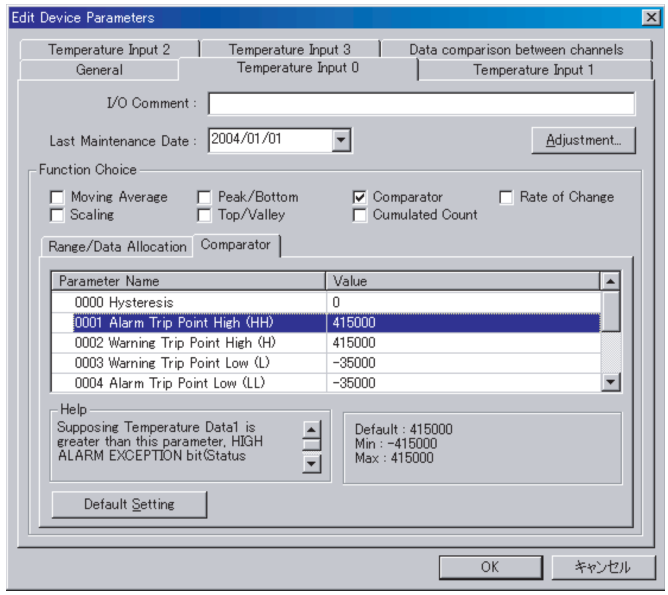

### Setting Using the DeviceNet Configurator

***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where the comparator function is to be set, and select ***Comparator*** under the *Function Choice* heading.



3. Click the **Comparator** Tab and set each of the alarm values. The example here shows the setting for *Alarm Trip Point High* (HH limit set value).



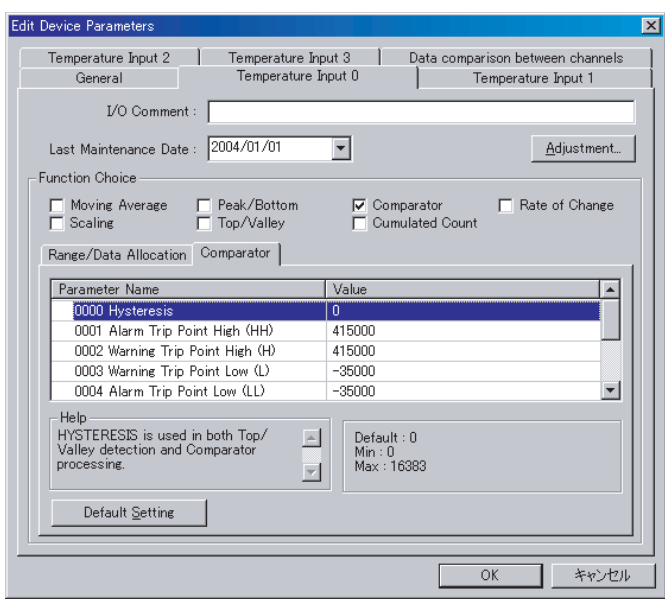

**Note** When setting the hysteresis value, adjust for each input's decimal point position or the 1/100 display mode if the 1/100 display mode is being used. Always correct the hysteresis value after changing the display mode setting or replacing the sensor with a sensor that has a different decimal point position.
Example hysteresis value settings for 10°C:

a) R thermocouple (normal display) setting: 0010 decimal

b) T thermocouple (normal display) setting: 0100 decimal

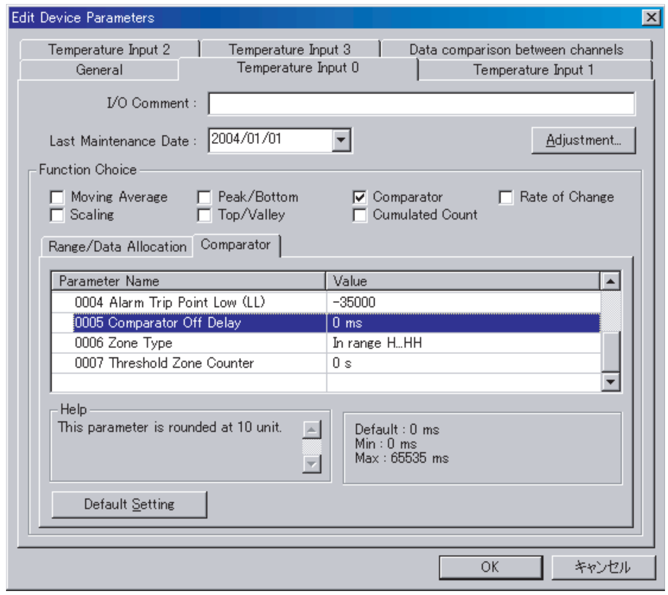
c) Setting for any input with 1/100 display: 1000 decimal

4. To set the hysteresis value, input the desired value in the *Hysteresis* field.




**Note** The hysteresis value set for the comparator function is also used by the top/valley hold function.

5. To set the OFF delay function, input the desired value in the *Comparator Off Delay* field.



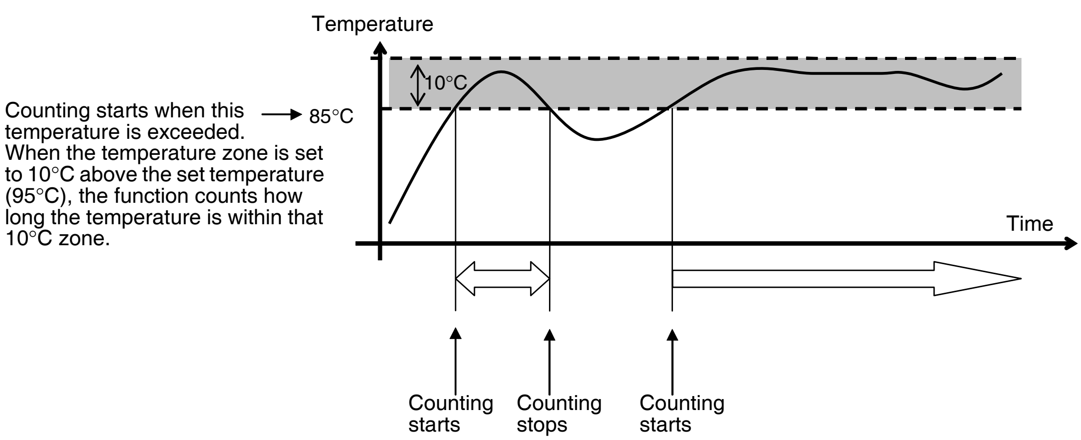

6. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
7. Click the **OK** Button and exit the window.

## Temperature Zone Counter Function (Zone Count)

This function times (in 1-second units) how long the temperature input value is within a user-set temperature range. The zone count can indicate when preventative maintenance is required for devices or applications that deteriorate at a fixed rate within the user-set temperature range.

Select the temperature zone settings in the **Comparator** Tab. The temperature zone boundaries are defined by the High High Limit (HH), High Limit (H), Low Low Limit (LL), or Low Limit (L). Any threshold value can be set in the Threshold Zone Counter to indicate when the threshold time within the zone has been exceeded.

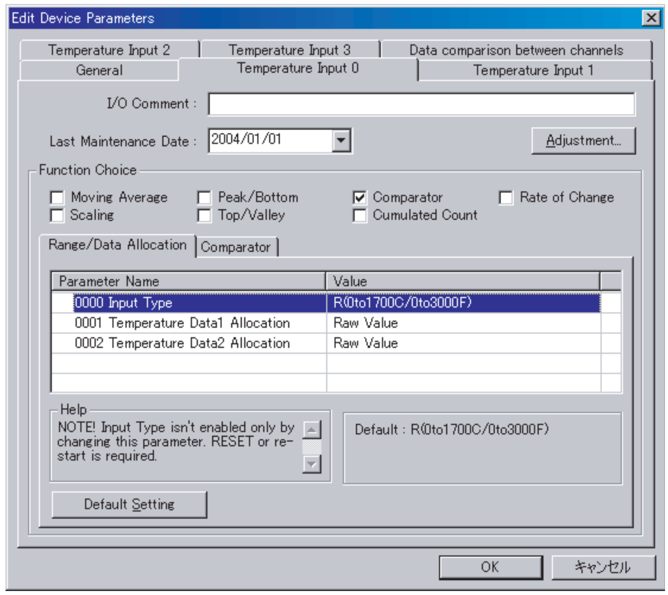
The Over Threshold status can be read in the Maintenance Information Window or via an explicit message.



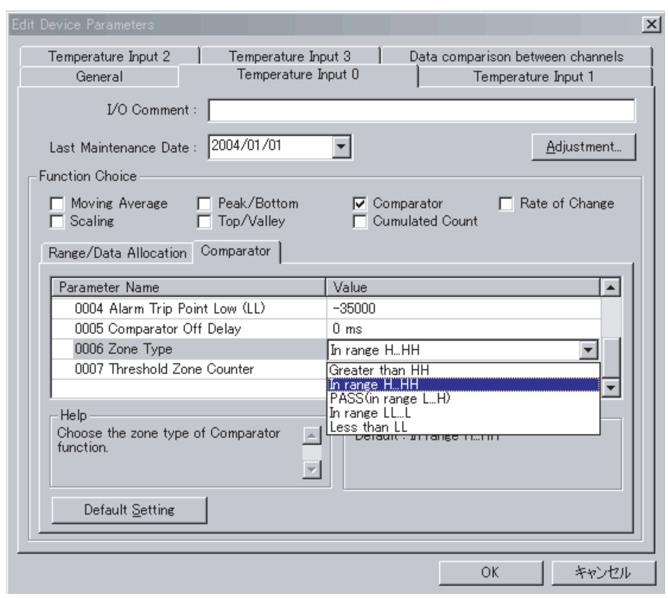
### Setting Using the DeviceNet Configurator

***1,2,3...***

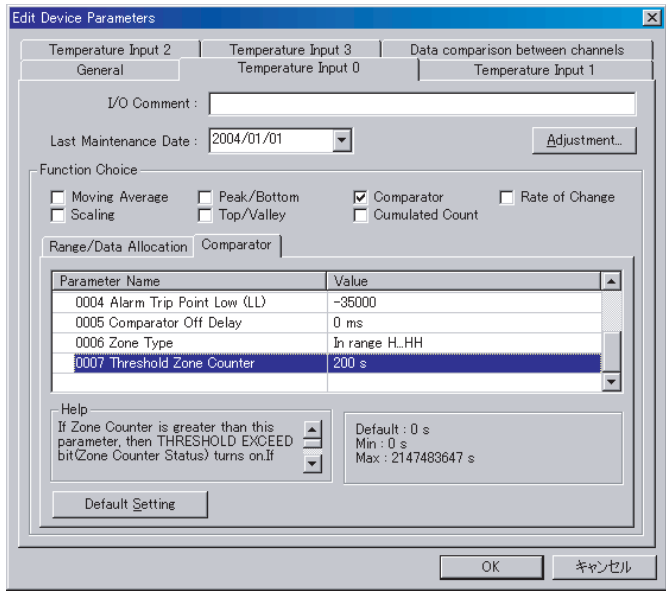
1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the Tab Page for the input where the Zone Count function is to be set, and select ***Comparator*** under the *Function Choice* heading.




3. Click the **Comparator** Tab and select the desired type of zone from the pull-down menu under the *Zone Type* field.



4. A threshold count value (time in seconds) can be set in the *Threshold Zone Counter* field to indicate when the temperature has been in the temperature zone longer than the threshold setting.




5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

### Data Comparison between Channels

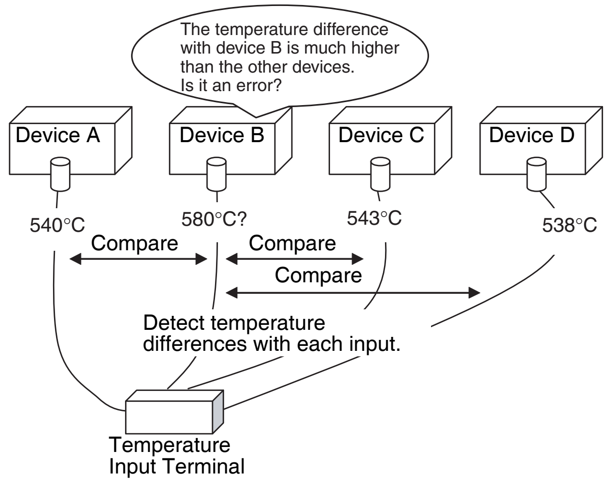
This function can be used to compare the temperature values in any two inputs (inputs 0 to 3) and monitor the relative temperature difference. A threshold value can be set to detect an excessive temperature difference for preventative maintenance in devices in which the temperature difference may cause or indicate a problem.

The comparison result and over-threshold status can be read in the Maintenance Information Window or via an explicit message.

**Note**

1. The comparison operation can be performed only on the data set as Temperature Data 2.
2. When the "peak value" or "bottom value" is selected as the temperature data for Temperature Data 2, that processed value will be used in the comparison operation and not the actual temperature input value.

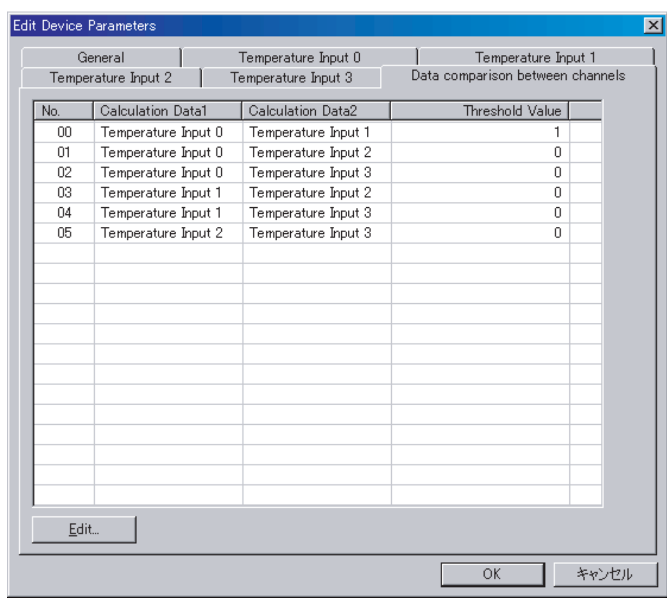
3. The comparison result will be read to a precision of 0.01, regardless of the setting.




### Setting Using the DeviceNet Configurator

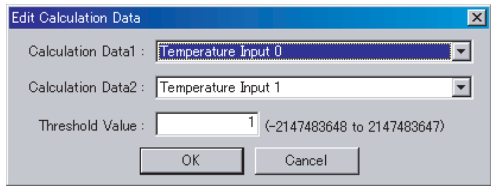
***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Select the **Data comparison between channels** Tab.




3. Double-click the **Calculation Data1** or **Calculation Data2** header cell to open the Edit Calculation Data Window. Select the two temperature inputs (to be compared) from the pull-down menus in the *Calculation Data1* and *Calculation Data2* fields.
   Set a threshold value in the *Threshold Value* field. Always set the threshold

value to a precision of 0.01. For example, when setting 10°C, input 1000 for 10.00°C.




4. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
5. Click the **OK** Button and exit the window.
6. The comparison results can be checked in the Maintenance Information Window or **Data comparison between channels** Tab.

## Off-wire Detection

When an input sensor is disconnected, the Off-wire Detection Flag turns ON for each input. The Off-wire Detection Flags are included in the Analog Status Flags.

When an off-wire condition is detected, the value of AD conversion data is set to 7FFF hex (7FFF FFFF when 1/100 display mode is being used). When the input returns to a value within the range that can be converted, the Off-wire Detection function will automatically be turned OFF, and normal data conversion will resume.

## Last Maintenance Date

The last maintenance date can be set in the Unit separately for the Unit and the connected devices. It enables the user to easily determine the next maintenance date. The date can be set using the Configurator.

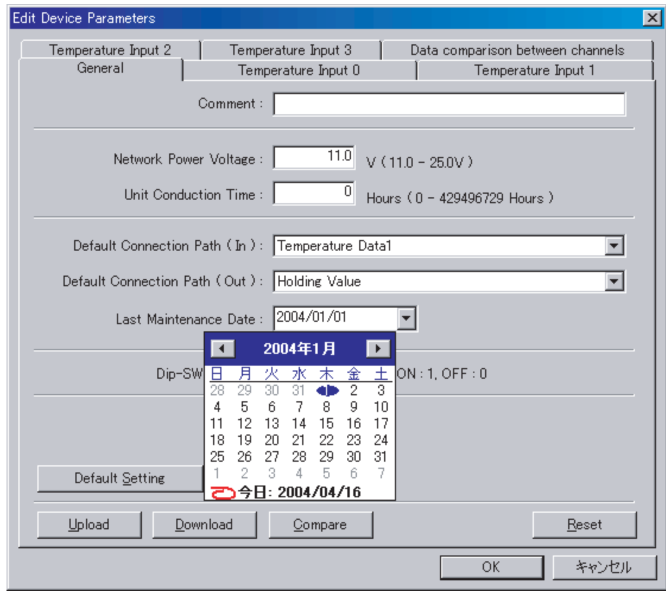
### Setting Using the DeviceNet Configurator

#### ■ Setting the Last Maintenance Date of the Unit

*1,2,3...*

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

2. Click the **General** Tab, and select the applicable date from the pull-down menu in the *Last Maintenance Date* field. (To enter the current date, select ***Today***, which is at the bottom of the pull-down menu.)

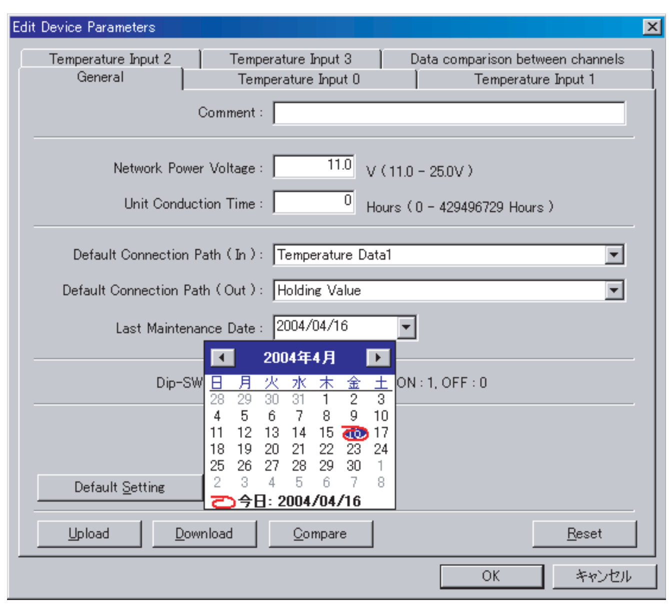


3. Click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

## ■ Setting the Last Maintenance Date of the Connected Device

***1,2,3...***

1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)
2. Click the Tab Page for the input that is connected to a connecting device requiring the last maintenance date to be set. Select the applicable date from the pull-down menu in the *Last Maintenance Date* field. (To enter the current date, select ***Today***, which is at the bottom of the pull-down menu.)



3. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
4. Click the **OK** Button and exit the window.

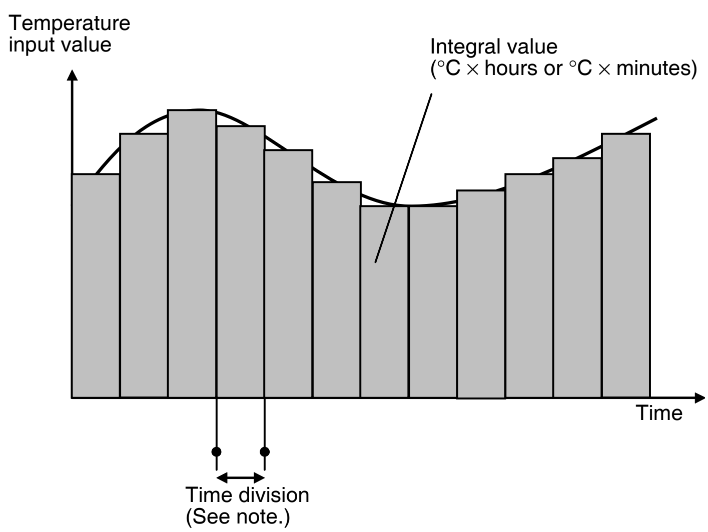
## Cumulative Counter

The cumulative counter integrates the temperature input value over time to determine the amount of heat endured by a sensor or device. calculates a time integral of analog input values over time. The cumulative value can be calculated in hours (°C × hours or °F × hours) or minutes (°C × minutes or °F × minutes).

For example, when the units are set to hours, a cumulative value of 100 hours indicates a temperature value equivalent to 100°C continuing for one hour. The value stored in the four-byte area (two words) is the integral value for 300 time divisions. The data is displayed according to the set conditions. (See notes 1 and 2.)

Monitor values can also be set in the Unit. When the cumulated count value exceeds the set monitor value, the Cumulative Counter Flag in the area for Generic Status Flags turns ON.

**Note**
1. When °F units are selected, the integration is performed on the °F values.
2. Even if the 1/100 display mode is selected, the integration is performed on the original (×100) temperature values.
3. The meaning of the integral value depends on the decimal point position for the temperature values.



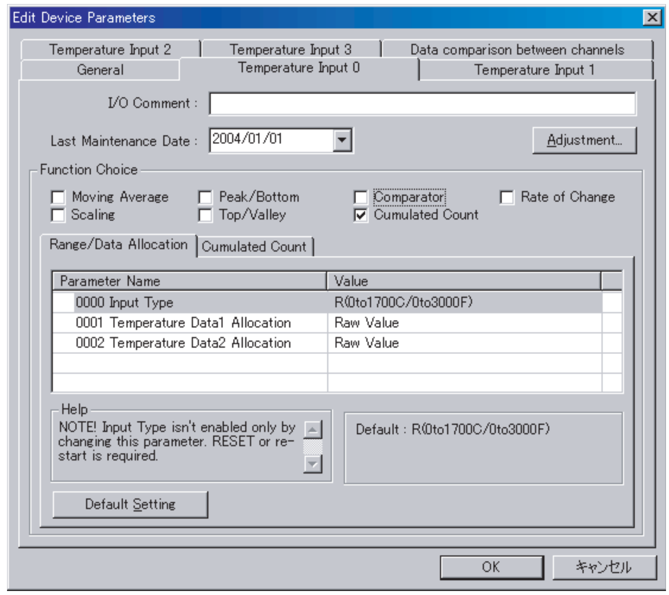

**Note** The following table shows the time divisions and number of measurements.

| Units | Time division | Number of measurements |
|---|---|---|
| Hours | 12 seconds | 300 |
| Minutes | 200 ms | 300 |

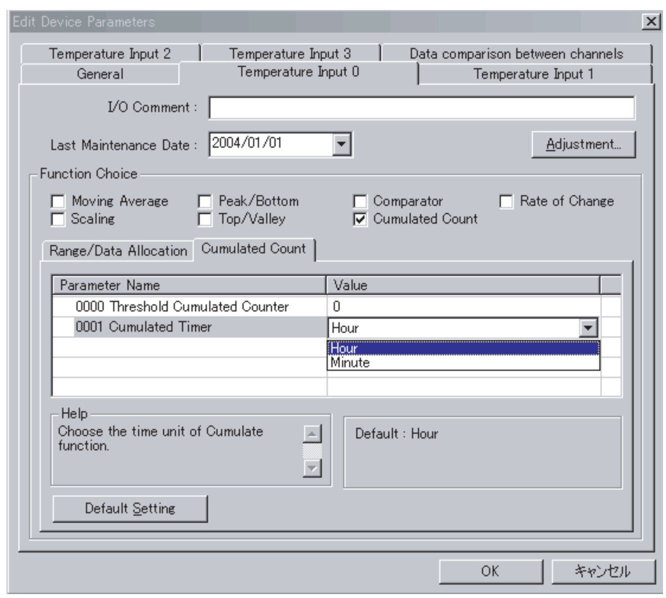
### Setting Using the DeviceNet Configurator

*1,2,3...*
1. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

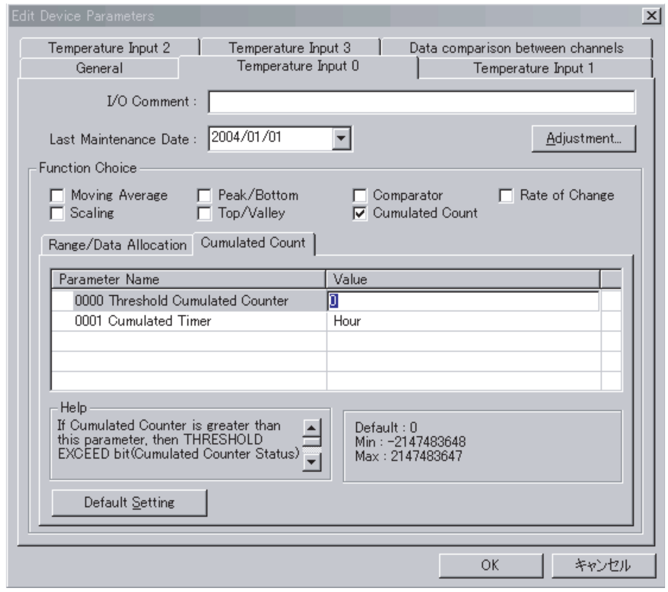
2. Select the Tab Page for the input where the cumulative counter is to be set, and select ***Cumulated Count*** under the *Function Choice* heading.




3. To set the counter unit, click the **Cumulated Count** Tab and select ***Hour*** or ***Minute*** from the pull-down menu in the *Cumulated Timer* field.



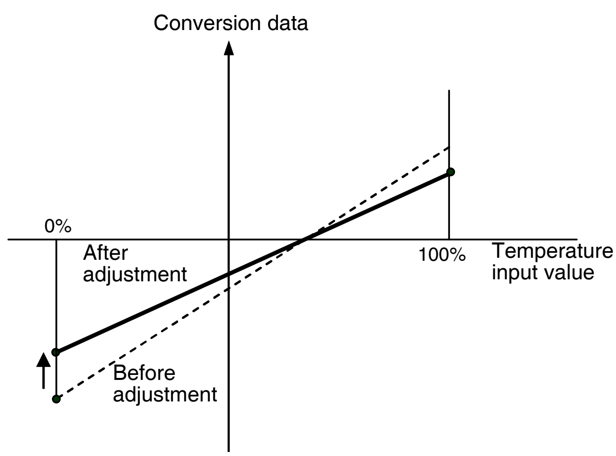
4. To set the monitor value, click the **Cumulated Count** Tab, and input the desired value in the *Threshold Cumulated Counter* field.




5. Return to the **General** Tab, click the **Download** Button, and then click the **Reset** Button to reset the Unit.
6. Click the **OK** Button and exit the window.

## User Adjustment

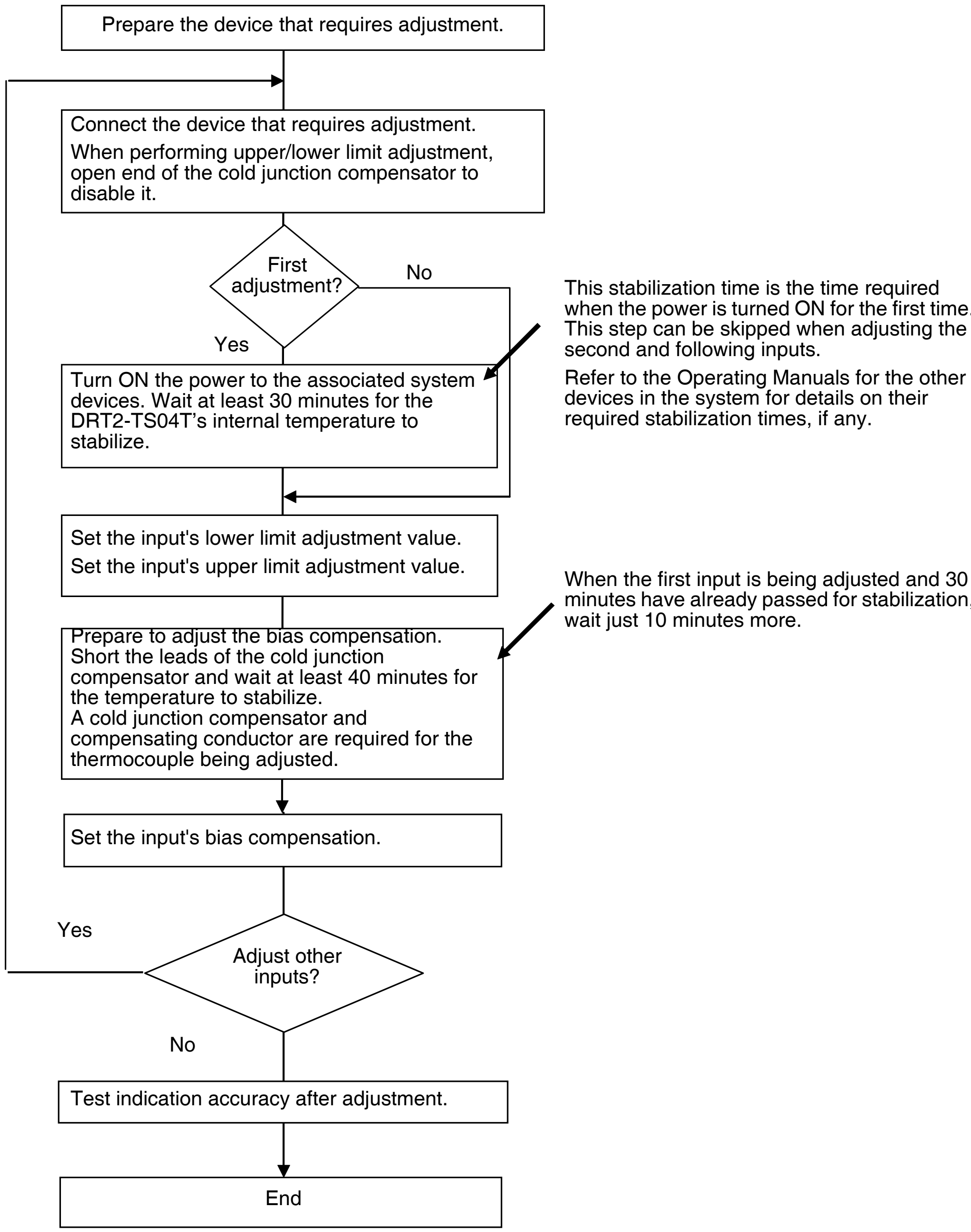
This function can be used to compensate for offsets in the input values caused by factors such as the characteristics and connection methods of the input sensor.




**Note**
1. Temperature Input Terminals are properly adjusted at the factory before shipment, so it is normally unnecessary to make adjustments. Use the User Adjustment function only when absolutely necessary. OMRON is not responsible for the results of user adjustments. If a mistake is made in the adjustments, the adjustment data can be cleared to return to the factory default settings.
2. The Temperature Input Terminal continues the temperature conversion operations even after user adjustments have been made. It is possible for temperature data values to change suddenly from previous values after the user adjustments are made, so always consider the effects on the operating environment before applying user adjustments.

**Adjustment Procedure for the DRT2-TS04T**

Use the following procedure to adjust the Temperature Input Terminal. Follow the flowchart closely for proper adjustment.




**Note** The only sensors that can be adjusted are ones that operate while the power supply is ON. When adjusting for sensors that are not presently in use, change the input type setting, toggle the power supply or reset the Unit from the Configurator, and perform the adjustment procedure from the beginning of the flowchart.

### Connecting the Devices required for DRT2-TS04T Adjustment

The following paragraphs explain how to connect the devices that must be connected to the DRT2-TS04T for user adjustment. Wire the following devices properly when adjusting the DRT2-TS04T.

#### ■ Reference Voltage/Current Generator and Precision Digital Multimeter

Used to make adjustments at the upper limit and lower limit.

Prepare devices that can generate accurate 0 mV, 20 mV, and 50 mV voltages. Use a precision digital multimeter that can measure the output voltage and indicate when the voltage/current generator is not producing an accurate voltage output.

#### ■ Cold Junction Compensator (such as a ZERO-CON 0°C Bath) and Compensating Conductors

Used to adjust the bias compensation value.

The cold junction compensator (the ZERO-CON 0°C bath is used in following examples) is a device that maintains an accurate 0°C (32°F) temperature for thermocouple sensors. Use a cold junction compensator compatible with the sensor being adjusted.

**Note** When using an R, S, E, B, or W type thermocouple, a K type can be substituted. Set the ZERO-CON to 0°C (32°F).

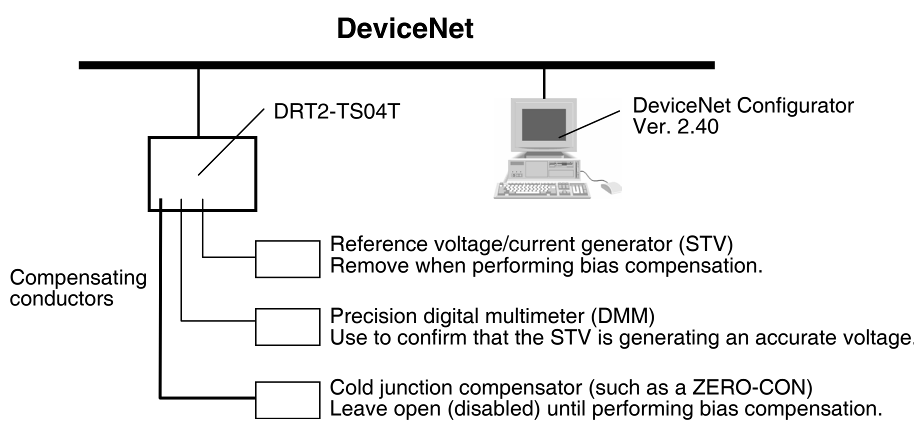
#### ■ DeviceNet Configurator (Version 2.40 or Higher)

The actual adjustment operations are performed with the Configurator. Check the version of the Configurator, because the DRT2-TS04T cannot be adjusted with an old version.

Refer to the DeviceNet Configurator Operation Manual for details on the Configurator.

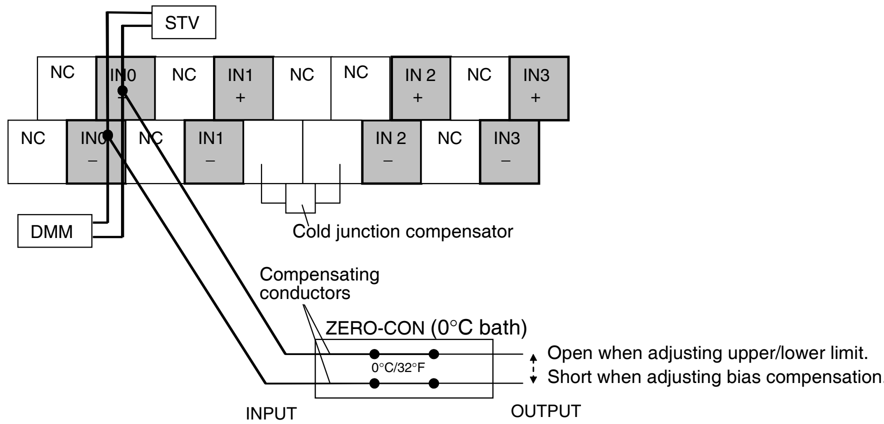
**Adjustment Device Connection Diagram**

Connect the reference voltage/current generator (STV), precision digital multimeter (DMM), and cold junction compensator to the input terminals. In the following examples, the devices are connected to input 1, but connect to the corresponding terminals when adjusting inputs 2 to 4.




**Note** The personal computer (Configurator) is connected through DeviceNet in the diagram above. If a CS1W-DRM21 or CJ1W-DRM21 Master Unit is being used, the Configurator can also be connected through the Master Unit using a peripheral bus connection. Refer to the Configurator Operation Manual for details.

**Input Terminal Connections**




### Checking the Wiring and Making Adjustments

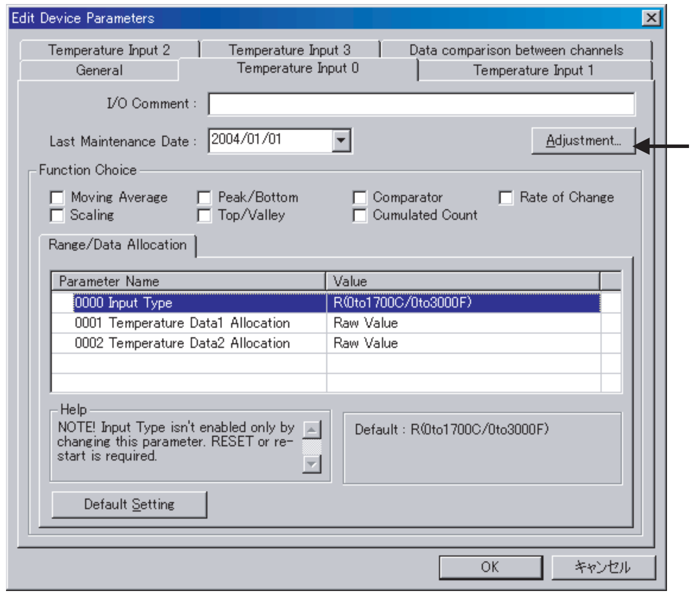
#### ■ Adjusting the DRT2-TS04T's Upper and Lower Limit Values

***1,2,3...***

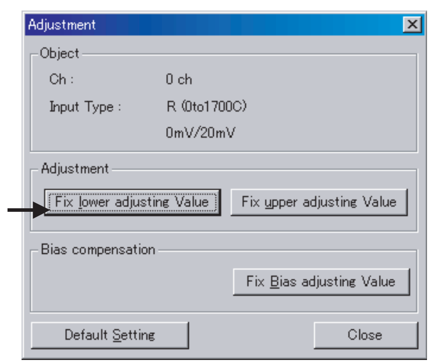
1. Open the thermocouple leads from the ZERO-CON (0°C bath).
2. Check the sensor and input type being used.

   **Note** When using an R, S, B, E, or W sensor, use a K thermocouple's compensating conductors. In addition, when using an R, S, or B type sensor, set the input type as K2 (0.0 to 500.0°C). When using an E or W type sensor, set the input type as K1 (–200 to 1,300°C).
3. Connect the Configurator to the DeviceNet network and go online.
4. Upload settings to the Configurator.
5. Turn ON the power supplies of all Units, including the Temperature Input Terminal to be adjusted. Wait approximately 30 minutes for the Temperature Input Terminal's internal temperature to stabilize.
6. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

7. Select the Tab Page for the input that will be adjusted and click the **Adjustment** Button to open the Adjustment Window.



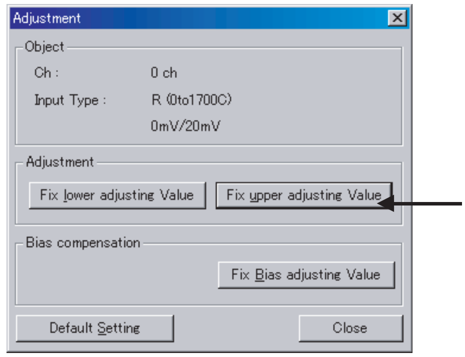

8. Adjust the lower limit value (lower adjusting value). Input 0 mV from the reference voltage/current generator (STV) to the Temperature Input Terminal's input terminals. Wait at least 1 minute for the input to stabilize.
9. Click the **Fix lower adjusting Value** Button. The lower limit adjustment value will be stored in the Unit.




10. Adjust the upper limit value (upper adjusting value). Input the upper limit voltage from the reference voltage/current generator to the input terminals of the input to be adjusted. Refer to the following table for the appropriate voltage. Wait at least 1 minute for the input to stabilize.

| Input type | Input voltage |
|---|---|
| K1 | 50 mV |
| K2 | 20 mV |
| J1 | 50 mV |
| J2 | 20 mV |
| T | 20 mV |
| L1 | 50 mV |
| L2 | 20 mV |
| U | 20 mV |
| N | 50 mV |
| PLII | 50 mV |

11. Click the **Fix upper adjusting Value** Button. The upper limit adjustment value will be stored in the Unit.

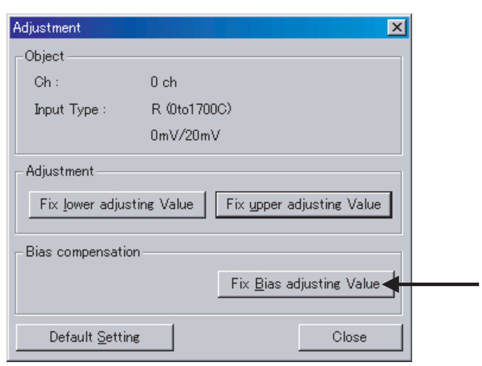



12. To check whether the user adjustment values have been accepted and the Unit is operating with adjustment values different from the factory defaults, click the right mouse button over the Slave icon and select ***Maintenance Information*** to open the Maintenance Information Window.
    Select the Tab Page for the input that was adjusted. If there is a check in the *User Adjustment* Box (bottom right box), the Unit is operating with user-set adjustment values.

**Note**
1. When checking whether or not the user adjustment values have been set correctly, always refresh the data by clicking the **Update** Button in the Maintenance Information Window's **General** Tab or uploading the settings again. For details on the Maintenance Information Window, refer to *7-3 Maintenance Information Window*.
2. If the correct reference voltage was not input, the adjustment values may not be accepted.

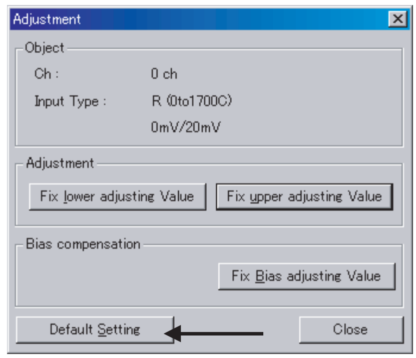
### ■ Adjusting the DRT2-TS04T's Bias Compensation Value

***1,2,3...***
1. Disconnect the reference voltage/current generator (STV) and short the leads from the ZERO-CON (0°C bath).
2. After completing the wiring, wait at least 40 minutes, and click the **Fix Bias adjusting Value** Button. The bias compensation value will be stored in the Unit.



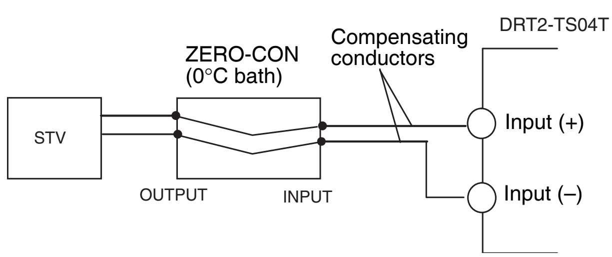
### ■ Resetting User Adjustments

If it is necessary to reset the upper limit adjustment value, lower limit adjustment value, and bias compensation value to the factory defaults, click the **Default Setting** Button. The settings will be returned to the factory settings. The upper/lower limit adjustment values and bias compensation value are all initialized at the same time.




**Note**
1. The bias compensation value may not be accepted if there is a large temperature difference between the Terminal Block and ZERO-CON (0°C bath). If this problem occurs, correct the adjustment system by using a ZERO-CON compatible with the sensor being adjusted or other means.
2. Always test the indication accuracy after making user adjustments to verify that the adjustments are correct. Test the indication accuracy at three points: the lower limit value, an intermediate value, and the upper limit value.
   - Connect the external devices as shown in the following diagram.
   - After verifying that the ZERO-CON is set to 0°C, set the STV's output voltage to produce a voltage equivalent to the test voltage.

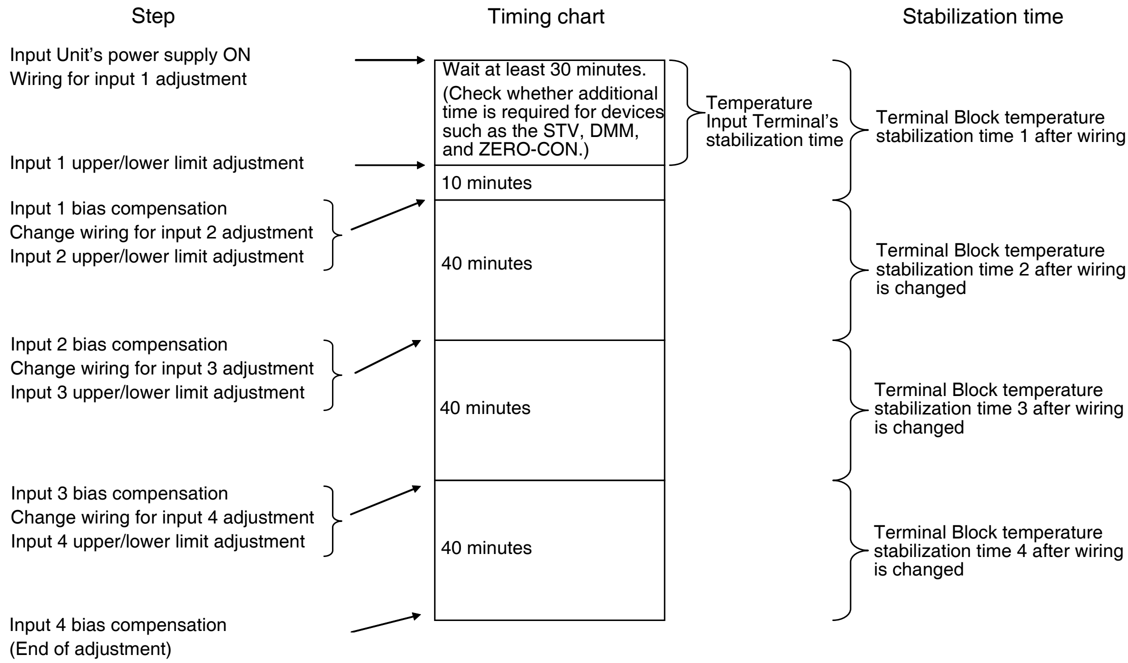
   **Note** Always use the compensating conductors (the same kind that will be used with the sensor being adjusted) to connect the ZERO-CON to the DRT2-TS04T's input terminals.




**Note** In order to perform the adjustment procedure properly, always allow sufficient time for temperature stabilization, as shown in the following diagram. Also allow sufficient time for devices such as the STV, DMM, and ZERO-CON to stabilize. Refer to each device's operating manual for details.

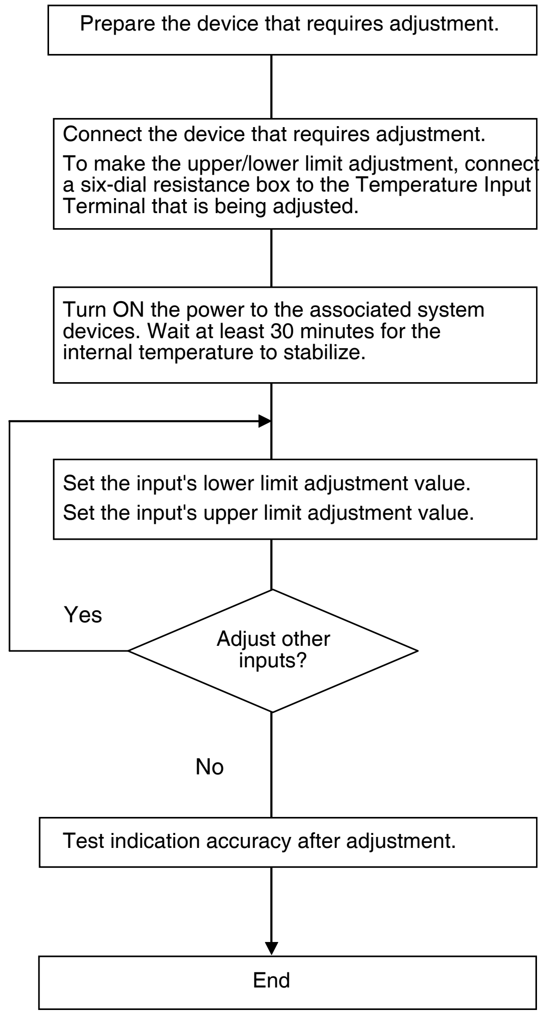
**Stabilization Times required in Each Step**

The following diagram shows the stabilization times (waiting times) required when adjusting all 4 inputs.




**Note** The terminal block temperature stabilization time does not affect the upper/lower limit adjustment after changing the wiring for inputs 2, 3, and 4, so the adjustment can be performed immediately if 30 minutes have passed since the Temperature Input Terminal's power was turned ON.

### Adjustment Procedure for the DRT2-TS04P




**Note** The only sensors that can be adjusted are ones that operate while the power supply is ON. When adjusting for sensors that are not presently in use, change the input type setting and perform the adjustment procedure from the beginning of the flowchart.

### Connecting the Devices required for DRT2-TS04P Adjustment

The following paragraphs explain how to connect the devices that must be connected to the DRT2-TS04T for user adjustment. Wire the following devices properly when adjusting the DRT2-TS04T.

#### ■ Six-dial Resistance Box and Precision Digital Multimeter

Used to make adjustments at the upper limit and lower limit.

Prepare device that can provide accurate resistance values for measurement. Use a precision digital multimeter that can measure the resistance values and indicate when the six-dial resistance box is not producing an accurate resistance.

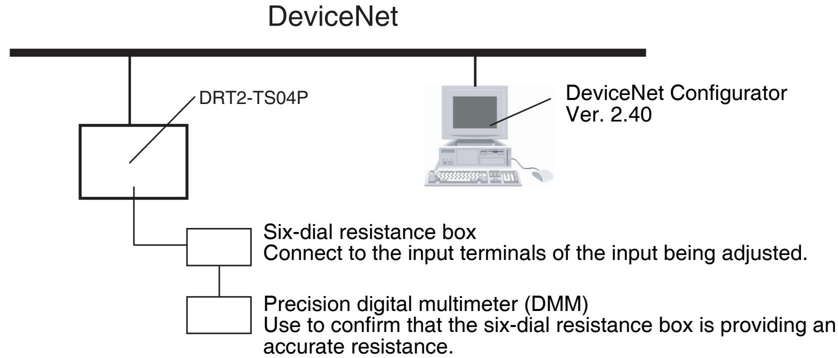
#### ■ DeviceNet Configurator (Version 2.40 or Higher)

The actual adjustment operations are performed with the Configurator. Check the version of the Configurator, because the DRT2-TS04P cannot be adjusted with an old version.

Refer to the DeviceNet Configurator Operation Manual for details on the Configurator.

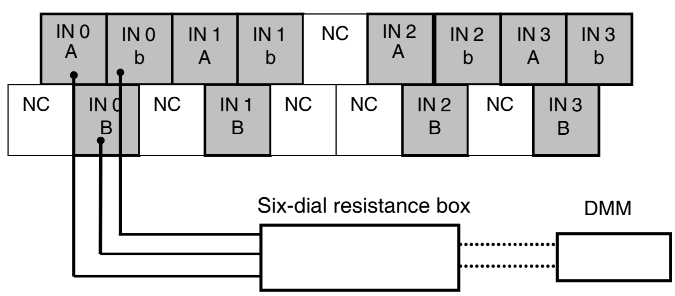
<u>**Adjustment Device Connection Diagram**</u>

Connect the six-dial resistance box to the input terminals. In the following examples, the devices are connected to input 1, but connect to the corresponding terminals when adjusting inputs 2 to 4.




**Note**
1. When connecting the six-dial resistance box, use a cable with the same gauge as the one that will be used for operation.
2. The personal computer (Configurator) is connected through DeviceNet in the diagram above. If a CS1W-DRM21 or CJ1W-DRM21 Master Unit is being used, the Configurator can also be connected through the Master Unit using a peripheral bus connection. Refer to the Configurator Operation Manual for details.

<u>**Input Terminal Connections**</u>

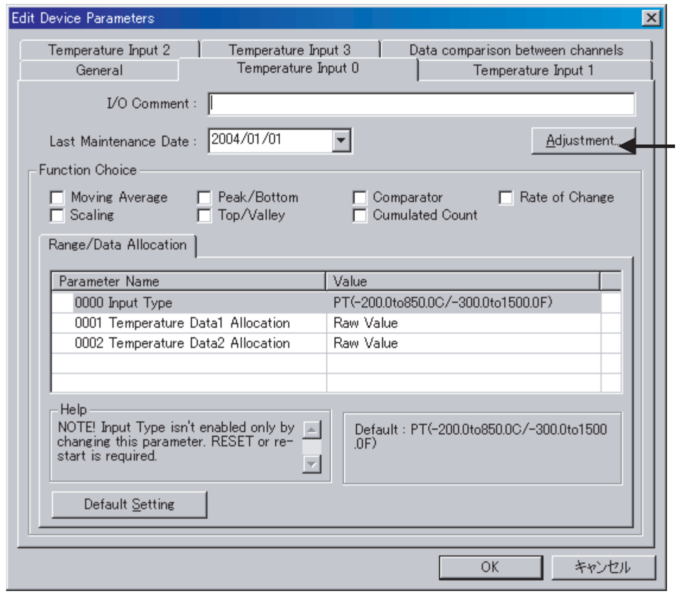



### Checking the Wiring and Making Adjustments

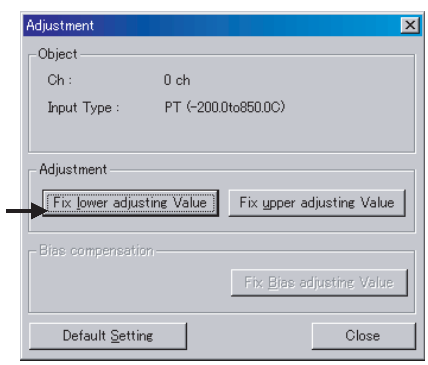
#### ■ Adjusting the DRT2-TS04P's Upper and Lower Limit Values

***1,2,3...***
1. Set the resistance value on the six-dial resistance box equivalent to the test value and properly wire the box to the input of the Temperature Input Terminal that is being adjusted.
2. If the correct resistance cannot be obtained, properly wire the digital multimeter to the six-dial resistance box and measure the resistance.
3. Connect the Configurator to the DeviceNet network and go online.
4. Upload settings to the Configurator.
5. Turn ON the power supplies of all Units, including the Temperature Input Terminal to be adjusted. Wait approximately 30 minutes for the Temperature Input Terminal's internal temperature to stabilize.
6. Double-click the icon of the Temperature Input Terminal to be set in the Main Window and open the Edit Device Parameters Window. (From the Maintenance Mode Window, click the right mouse button over the Slave icon and select ***Parameters*** and ***Edit***.)

7. Select the Tab Page for the input that will be adjusted and click the **Adjustment** Button to open the Adjustment Window.



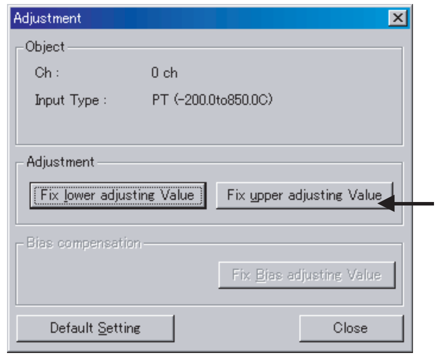

8. Adjust the lower limit value (lower adjusting value). Input 18 Ω from the six-dial resistance box to the Temperature Input Terminal's input terminals. Wait at least 1 minute for the input to stabilize.
9. Click the **Fix lower adjusting Value** Button. The lower limit adjustment value will be stored in the Unit.



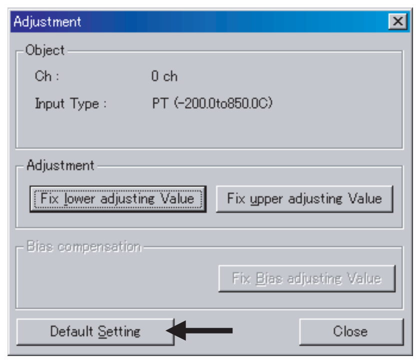

10. Adjust the upper limit value (upper adjusting value). Input either 180 Ω or 390 Ω from the six-dial resistance box to the input terminals of the input to be adjusted. Refer to the following table for the appropriate resistance. Wait at least 1 minute for the input to stabilize.

| Input type | Input resistance for upper limit adjustment |
|---|---|
| PT | 390 Ω |
| JPT | 390 Ω |
| PT2 | 180 Ω |
| JPT2 | 180 Ω |

11. Click the **Fix upper adjusting Value** Button. The upper limit adjustment value will be stored in the Unit.




12. If it is necessary to restore the upper and lower limit adjustment values to the factory default settings, click the **Default Setting** Button. The settings will be returned to the factory settings.

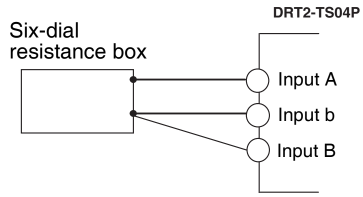



13. To check whether the user adjustment values have been accepted and the Unit is operating with adjustment values different from the factory defaults, click the right mouse button over the Slave icon and select ***Maintenance Information*** to open the Maintenance Information Window.
    Select the Tab Page for the input that was adjusted. If there is a check in the *User Adjustment* Box (bottom right box), the Unit is operating with user-set adjustment values.

**Note**

1. When checking whether or not the user adjustment values have been set correctly, always refresh the data by clicking the **Update** Button in the Maintenance Information Window's **General** Tab or uploading the settings again. For details on the Maintenance Information Window, refer to *7-3 Maintenance Information Window*.
2. Always test the indication accuracy after making user adjustments to verify that the adjustments are correct. Test the indication accuracy at three points: the lower limit value, an intermediate value, and the upper limit value.
    - Connect the external devices as shown in the following diagram.
    - Wait at least 30 minutes after the Temperature Input Terminal's power is turned ON and set the resistance value on the six-dial resistance box equivalent to the test value.

**Note** If the power supply is not turned OFF after making an adjustment, it is not necessary to wait 30 minutes before continuing testing.



# SECTION 8
# Communications Timing

This section provides information on the time required for a complete communications cycle, for an output response to be made to an input, to start the system, and to send messages.

# 8-1 Remote I/O Communications Characteristics

This section describes the characteristics of DeviceNet remote I/O communications when OMRON Master and Slave Units are being used. Use this section for reference when planning operations that require precise I/O timing.

The equations provided here are valid under the following conditions:

- The Master Unit is operating with the scan list enabled.
- All of the required Slaves are participating in communications.
- No errors are being indicated at the Master Unit.
- Messages are not being produced in the Network (from another company's configurator, for example).

**Note** The values provided by these equations may not be accurate if another company's Master or Slave is being used in the Network.

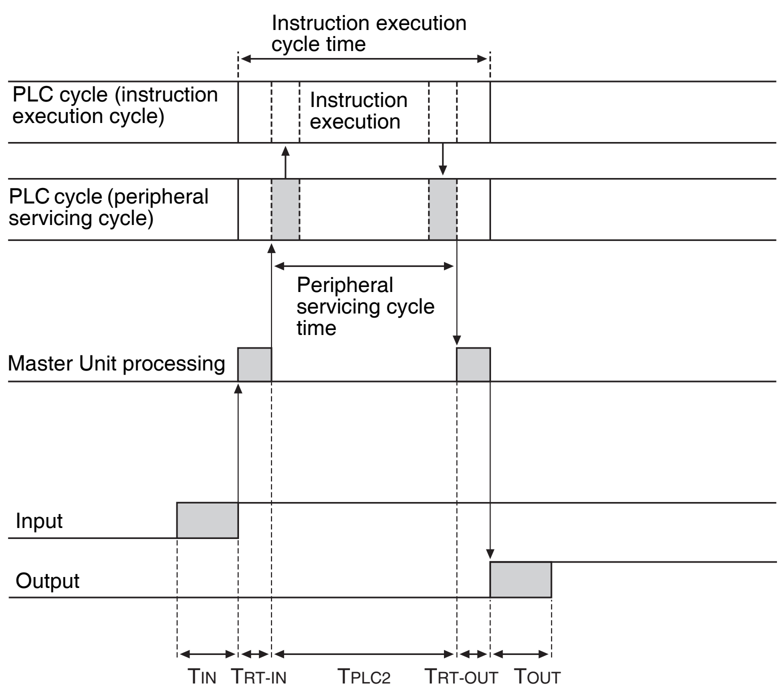
## 8-1-1 I/O Response Time

The I/O response time is the time it takes from the reception of an input signal at an Input Slave to the output of the corresponding output signal at an Output Slave after being processed by the ladder program at the Master.

### CVM1- and CV-series PLCs (Asynchronous Mode)

**Minimum I/O Response Time**

The minimum I/O response time occurs when the DeviceNet Master Unit refreshing is executed just after the input signal is received by the Master and instruction execution is completed within one peripheral servicing cycle.




$T_{IN}$: The Input Slave's ON (OFF) delay (Minimum value: 0)

$T_{OUT}$: The Output Slave's ON (OFF) delay (Minimum value: 0)

$T_{RT\text{-}IN}$: The Input Slave's communications time/Slave (Refer to page 456.)

$T_{RT\text{-}OUT}$: The Output Slave's communications time/Slave (Refer to page 456.)

$T_{PLC2}$: The PLC's peripheral servicing cycle time

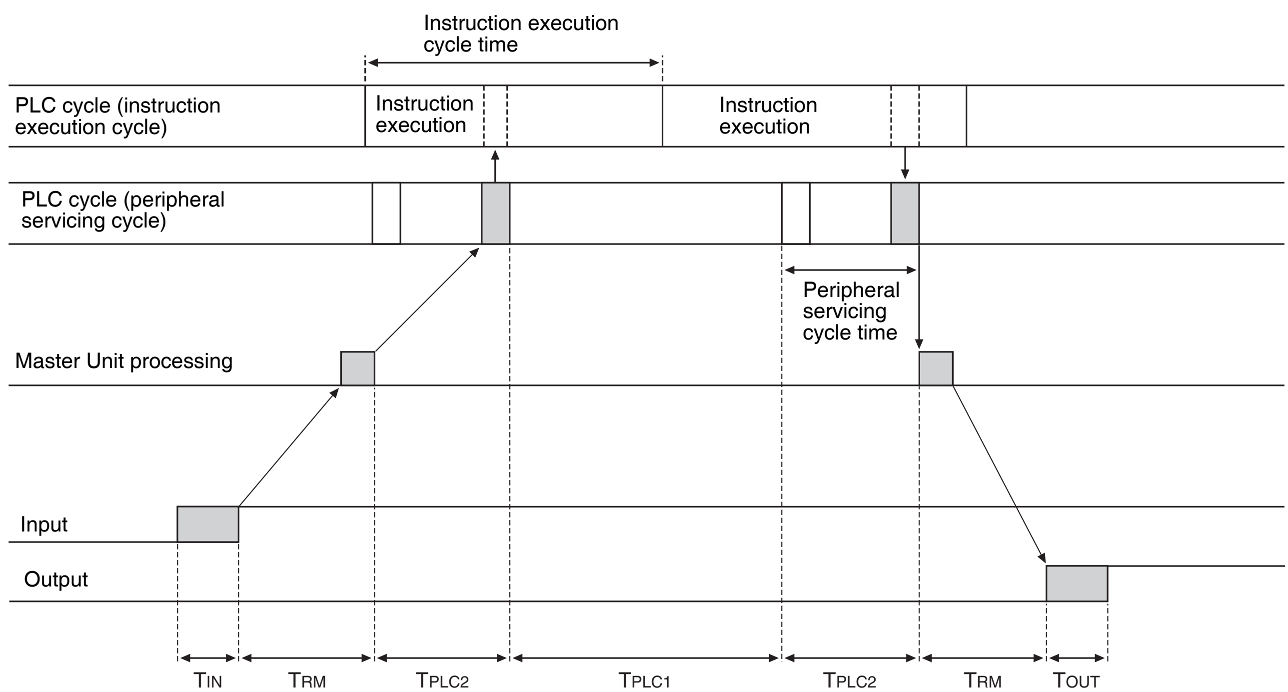
**Note** Refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's peripheral servicing cycle time.

The minimum I/O response time ($T_{MIN}$) is the total of the following terms:

$T_{MIN} = T_{IN} + T_{RT\text{-}IN} + T_{PLC2} + T_{RT\text{-}OUT} + T_{OUT}$

### Maximum I/O Response Time

The maximum I/O response time occurs with the I/O timing shown in the following diagram.




$T_{IN}$: The Input Slave's ON (OFF) delay

$T_{OUT}$: The Output Slave's ON (OFF) delay

$T_{RM}$: The whole Network's communications cycle time (Refer to page 457.)

$T_{PLC1}$: The PLC's instruction execution cycle time

$T_{PLC2}$: The PLC's peripheral servicing cycle time

**Note** Refer to *SECTION 4 Functions of All Slaves, General-purpose Slaves, and Environment-resistive Slaves*, *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's instruction execution and peripheral servicing cycle times.

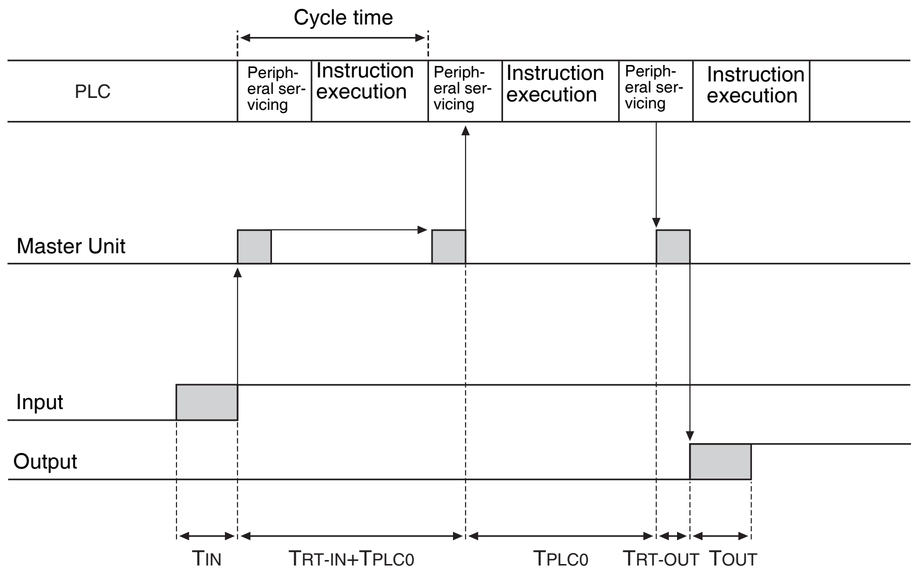
The maximum I/O response time ($T_{MAX}$) is the total of the following terms:

$T_{MAX} = T_{IN} + 2 \times T_{RM} + T_{PLC1} + 2 \times T_{PLC2} + T_{OUT}$

## CVM1- and CV-series PLCs (Synchronous Mode)

**Minimum I/O Response Time**

The minimum I/O response time occurs with the I/O timing shown in the following diagram.




$T_{IN}$: The Input Slave's ON (OFF) delay (Minimum value: 0)

$T_{OUT}$: The Output Slave's ON (OFF) delay (Minimum value: 0)

$T_{RT\text{-}IN}$: The Input Slave's communications time/Slave (Refer to page 456.)

$T_{RT\text{-}OUT}$: The Output Slave's communications time/Slave (Refer to page 456.)

$T_{PLC0}$: The PLC's cycle time (instruction execution + peripheral servicing)

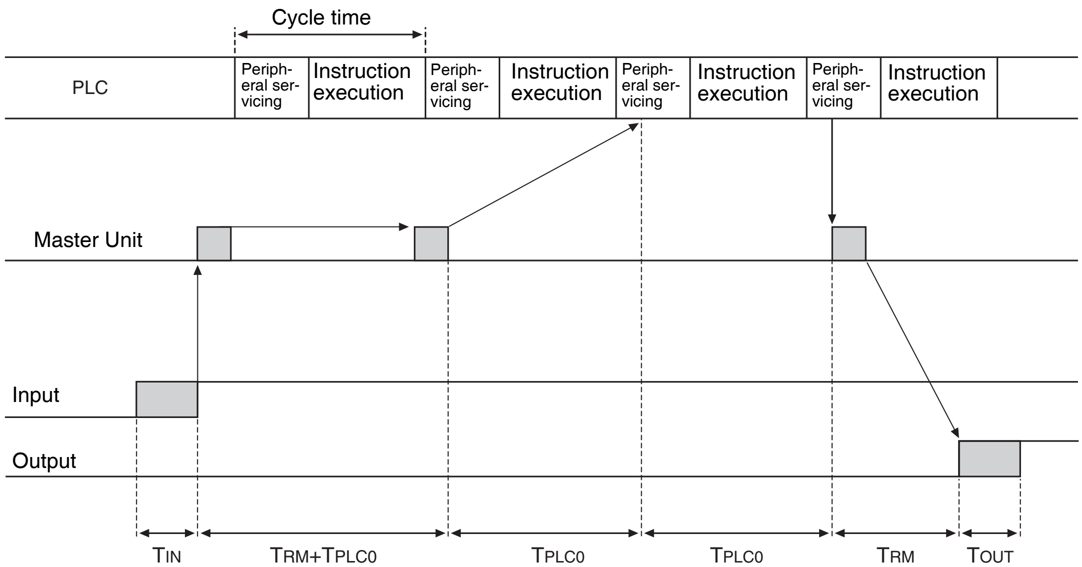
**Note** Refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's cycle time.

The minimum I/O response time ($T_{MIN}$) is the total of the following terms:

$T_{MIN} = T_{IN} + T_{RT\text{-}IN} + 2 \times T_{PLC0} + T_{RT\text{-}OUT} + T_{OUT}$

**Maximum I/O Response Time**

The maximum I/O response time occurs with the I/O timing shown in the following diagram.




$T_{IN}$: The Input Slave's ON (OFF) delay

$T_{OUT}$: The Output Slave's ON (OFF) delay

$T_{RM}$: The whole Network's communications cycle time (Refer to page 455.)

$T_{PLC0}$: The PLC's cycle time (instruction execution + peripheral servicing)

**Note** Refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's instruction execution and peripheral servicing cycle times.

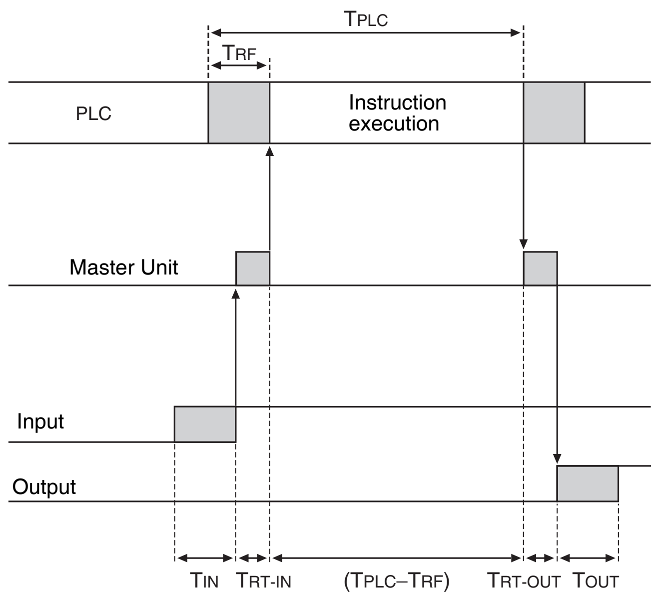
The maximum I/O response time ($T_{MAX}$) is the total of the following terms:

$T_{MAX} = T_{IN} + 2 \times T_{RM} + 3 \times T_{PLC0} + T_{OUT}$

## CS, CJ, C200HX/HG/HE (-Z), and C200HS PLCs

**Minimum I/O Response Time**

The minimum I/O response time occurs when the DeviceNet Slave I/O refreshing is executed just after the input signal is received by the Master and I/O is refreshed for the Slave first in the next I/O refresh cycle.




$T_{IN}$: The Input Slave's ON (OFF) delay (Minimum value: 0)

$T_{OUT}$: The Output Slave's ON (OFF) delay (Minimum value: 0)

$T_{RT\text{-}IN}$: The Input Slave's communications time/Slave (Refer to page 456.)

$T_{RT\text{-}OUT}$: The Output Slave's communications time/Slave (Refer to page 456.)

$T_{PLC}$: The PLC's cycle time

$T_{RF}$: The PLC's DeviceNet Unit refresh time (Refer to page 457.)

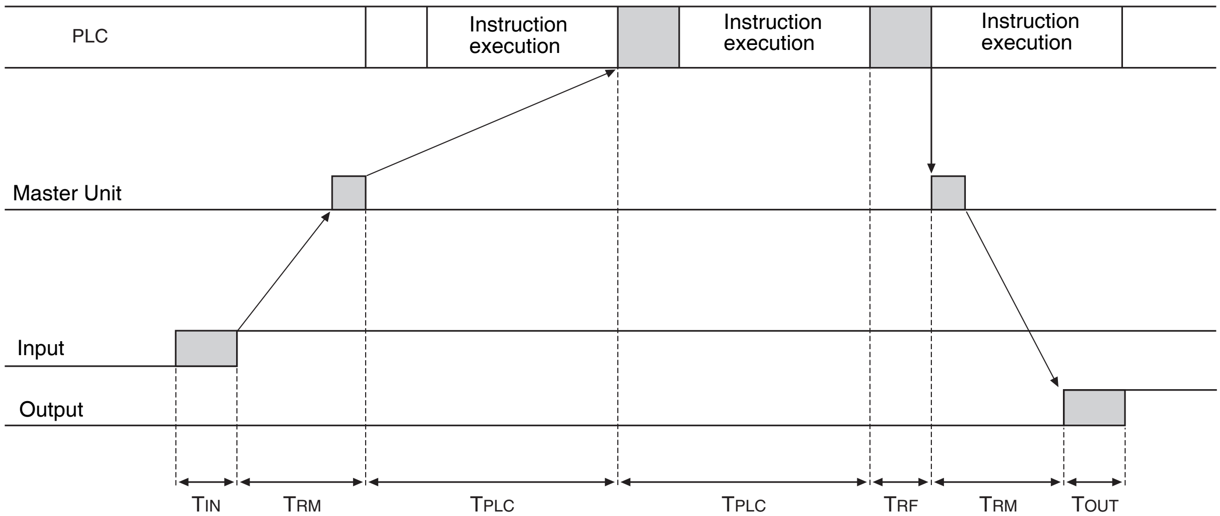
**Note** Refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's cycle time.

The minimum I/O response time ($T_{MIN}$) is the total of the following terms:

$T_{MIN} = T_{IN} + T_{RT\text{-}IN} + (T_{PLC} - T_{RF}) + T_{RT\text{-}OUT} + T_{OUT}$

**Maximum I/O Response Time**

The maximum I/O response time occurs with the I/O timing shown in the following diagram.




$T_{IN}$: The Input Slave's ON (OFF) delay

$T_{OUT}$: The Output Slave's ON (OFF) delay

$T_{RM}$: The whole Network's communications cycle time (Refer to page 456.)

$T_{PLC}$: The PLC's cycle time

$T_{RF}$: The PLC's DeviceNet Unit refresh time (Refer to page 457.)

**Note** Refer to *SECTION 5 General-purpose Slaves* and *SECTION 6 Environment-resistive Slaves* for details on Input and Output Slaves' ON and OFF delay times. Refer to *Refresh Time* on page 457 and the Operation Manual for the PLC being used for details on the PLC's cycle time.

The maximum I/O response time ($T_{MAX}$) is the total of the following terms:

$$T_{MAX} = T_{IN} + 2 \times T_{RM} + 2 \times T_{PLC} + T_{RF} + T_{OUT}$$

## 8-1-2 Communications Cycle Time and Refresh Time

The communications cycle time, communications time for each Slave, and refresh time are explained in this section. All of these times are necessary for calculating the time required for various processes in a DeviceNet Network.

### Communications Cycle Time

The communications cycle time is the time from the completion of a Slave's remote I/O communications processing until remote I/O communications with the same Slave are processed again. The communications cycle time is also used to calculate the maximum I/O response time.

The communications cycle time depends on several factors, including the number of Masters on the Network and on whether or not message communications are being per-formed. The following examples provide equations for when there is only one Master Unit. For details on cycle time equations for multiple Master Units, refer to page 457.

The following equations show the communications cycle time ($T_{RM}$) when there is only one Master in the Network.

Even if the equation result is less than 2 ms, the minimum communications cycle time ($T_{RM}$) is 2 ms.

$T_{RM}$ =Σ (communications time for each Slave)
+ MULTIPLE I/O TERMINAL processing time
+ Explicit message communications time
+ COS/Cyclic connection communications time [ms]
+ 0.01 × N + 1.0 [ms]

Communications time for each Slave:

Time required for each Slave. (Refer to pages 456 to 457.) Σ (communications time for each Slave) is the total of the processing of each Slave in the Network.

MULTIPLE I/O TERMINAL processing time:

3.5 [ms]

Only when Slaves with input, output or mixed I/O of more than 8 bytes exist.

Explicit message communications time:

$0.11 \times T_B + 0.6$ [ms]

Added as delay time when explicit message communications (send or receive) are used.

$T_B$: Constant (500 kbps: $T_B = 2$; 250 kbps: $T_B = 4$; 125 kbps: $T_B = 8$)

COS/Cyclic connection communications time:

$(0.05 + 0.008 \times S) \times TB \times n$ [ms]

Added as delay time when COS/Cyclic connection is used for communications.

S: Total size (bytes) of the COS/Cyclic connection's input size and output size.

n: Number of nodes for which COS/Cyclic connections occur at the same time during one communications cycle.

N: Number of Slaves

## Communications Time for each Slave

The communications time for each Slave is the time required for communications to be performed with a single Slave.

The following equations show the communications time per Slave ($T_{RT}$) for each kind of Slave Unit.

**Output Slaves with up to 8 Bytes of Output**

$T_{RT} = 0.016 \times T_B \times S_{OUT1} + 0.11 \times T_B + 0.07$ [ms]

$S_{OUT1}$: The number of Output Slave output words

$T_B$: The baud rate (500 kbps: $T_B = 2$; 250 kbps: $T_B = 4$; 125 kbps: $T_B = 8$)

**Input Slaves with up to 8 Bytes of Input**

$T_{RT} = 0.016 \times T_B \times SOUT1 + 0.06 \times T_B + 0.05$ [ms]

$S_{IN1}$: The number of Input Slave input words

$T_B$: The baud rate (500 kbps: $T_B = 2$; 250 kbps: $T_B = 4$; 125 kbps: $T_B = 8$)

**Mixed I/O Slaves with up to 8 Bytes of I/O**

$T_{RT} = 0.016 \times T_B \times (S_{OUT2} + S_{IN2}) + 0.11 \times T_B + 0.07$ [ms]

$S_{OUT2}$: The number of Mixed I/O Slave output words

$S_{IN2}$: The number of Mixed I/O Slave input words

$T_B$: The baud rate (500 kbps: $T_B = 2$; 250 kbps: $T_B = 4$; 125 kbps: $T_B = 8$)

**Input Slaves, Output Slaves, or Mixed I/O Slaves with More than 8 Bytes of I/O**

$T_{RT} = T_{OH} + T_{BYTE\text{-}IN} \times B_{IN} + T_{BYTE\text{-}OUT} \times B_{OUT}$ [ms]

$T_{\text{-}OH}$: The overhead protocol

$T_{BYTE\text{-}IN}$: The input byte transmission time

$B_{IN}$: The number of input bytes

$T_{BYTE\text{-}OUT}$: The output byte transmission time

$B_{OUT}$: The number of output bytes

| Baud rate | $T_{OH}$ | $T_{BYTE\text{-}IN}$ | $T_{BYTE\text{-}OUT}$ |
|---|---|---|---|
| 500 kbps | 0.306 ms | 0.040 ms | 0.036 ms |
| 250 kbps | 0.542 ms | 0.073 ms | 0.069 ms |
| 125 kbps | 1.014 ms | 0.139 ms | 0.135 ms |

The number of output bytes ($B_{OUT}$) for Input Slaves only is 0, and the number of input bytes ($B_{IN}$) for Output Slaves only is 0.

## Refresh Time

The refresh time is the time required for I/O data to be exchanged between the PLC's CPU Unit and the DeviceNet Master Unit. The PLC's cycle time is increased when a Master Unit is mounted, as shown below.

**Note** Refer to the PLC's Operation Manual for more details on the refresh time and the PLC's cycle time.

**Master Unit for CV-series PLCs**

The PLC's cycle time (CPU Bus Unit servicing) is increased by the amount shown in the following table when a Master Unit is mounted to the PLC.

| Process | Processing time |
|---|---|
| CPU Bus Unit servicing | DeviceNet Unit refreshing: 1.1 ms |

**Master Unit for CS, CJ, C200HX/HG/HE (-Z), and C200HS PLCs**

The PLC's cycle time (I/O refreshing) is increased by the amount shown in the following table when a Master Unit is mounted to the PLC.

| Process | Processing time |
|---|---|
| I/O refreshing | DeviceNet Unit I/O refreshing:<br>Using Master Unit for CS, CJ, and C200HX/HG/HE (-Z) PLCs<br>1.72 + 0.022 × number of words (ms) (See note.)<br>Using Master Unit for C200HS PLCs<br>2.27 + 0.077 × number of words (ms) (See note.) |

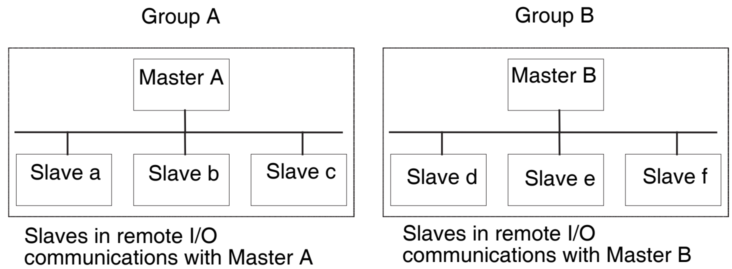
**Note** The number of words refreshed is the total number of words in the I/O Area that are allocated to the Slaves, including any unused words between those words actually used by the Slaves.
For example, if there are only two Input Slaves with node addresses 1 and 5, the 5 input words for nodes 1 through 5 would be refreshed even though the input words for nodes 2, 3, and 4 are unused.
If message communications are being performed, just add the number of words used in message communications to the above number of words for whenever messages are being processed.

## 8-1-3 More than One Master in Network

The following equation shows the communications cycle time ($T_{RM}$) when there is more than one Master in the Network.

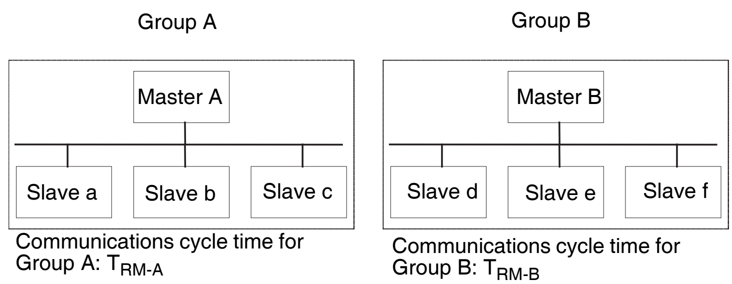
An example for two Master Units is shown here.

First, the Network is divided into two groups: Master A and the Slaves in remote I/O communications with it, and Master B and the Slaves in remote I/O communications with it.




**Note** Although in the above diagram the Slaves are separated into two separate groups for each Master for convenience, the actual physical positions of the Slaves in the Network are irrelevant.

Next, refer to page 456 and calculate the communications cycle time for each group as if they were separate Networks.




In Networks with two Masters, the communications cycle time for the entire Network will be the sum of the communications cycle times for both groups.

$$T_{RM} = T_{RM-A} + T_{RM-B}$$

Although this example shows only two Masters in the Network, the total communications cycle time for any Network with more than one Master can be calculated by dividing it into groups performing remote I/O communications and adding the communications cycle times of all the groups.

## 8-1-4 System Startup Time

This section describes the system startup time for a Network, assuming that the scan list is enabled and that remote I/O communications are set to start automatically at startup. The system startup time is the delay from the time that the Master Unit is turned ON or restarted until the time remote I/O communications begin.

The system startup time when the Master Unit is set to start up immediately after power supplies of all the Slaves' are turned ON is different from when the Master Unit is restarted while communications are in progress. The startup times are shown in the following table.

| Condition | Slave's indicator status | System startup time |
|---|---|---|
| The Master is started immediately after Slave startup. | NS indicator is OFF or flashing green. | 6 s |
| The Master only is restarted. | NS indicator is flashing red while the Master is OFF. | 8 s |
| The Slaves only are restarted. | --- | 10 s |

**Note** The above system startup time is only a guideline, and does not indicate the maximum value.

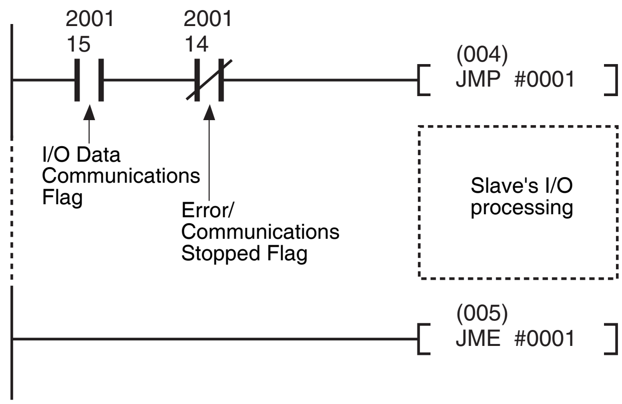
The system startup time varies depending on the system configuration and mode, such as the number of connected Slave Units and the startup times of connected Slaves.

**Program Example**

As shown in the preceding table, it takes time for DeviceNet communications to start up. This programming uses flags in the Master Status Area to prevent the Slaves' I/O processing from being performed until the Master Unit and remote I/O communications have started up.

**Note** Refer to the operation manual of the Master Unit being used for details on the Master Unit Status Area.

The following program example is for a CS1-series PLC and a Master Unit with a unit number of 00.




# 8-2 Message Communications Characteristics

## 8-2-1 Message Communications Time

The message communications time is the time required from the time a Master Unit starts to send a message over the Network to another node until the Master Unit completes sending the message (SEND(090)/RECV(098) instructions to send/receive data and CMND(490)/IOWR(223) instructions to execute FINS commands).

**Note** If the CPU Unit attempts to send another message or receives a message from another node before the message communications time has finished, the response message being sent or the message being received from another node may be destroyed. Always perform message communications at intervals longer than the message communications time and use message instructions (SEND(090), RECV(098), CMND(490), and IOWR(223)). Never send messages to any one node at intervals less than the message communications time.
If send or receive messages are destroyed, the error record will be placed in the error history of the Master Unit. If an error occurs, read the error history using the FINS command or monitor the error history from the Configurator.

The following equation can be used to calculate the approximate message communications time.

Message communications time = Communications cycle time ((No. of message bytes + 15) ÷ 6 + 1)

The number of message bytes is the number of data bytes following the FINS command code. The communications cycle time depends on whether remote I/O communications are being used.

### Message Communications Only (Remote I/O Communications Not Used)

Message communications time = 2 (see note) + 0.11 × $T_B$ + 0.6 (ms)

$T_B$: Baud rate (500 kbps: $T_B$ = 2; 250 kbps: $T_B$ = 4; 125 kbps: $T_B$ = 8)

**Note** The communications cycle when remote I/O communications are not being used is 2 ms.

### Message Communications with Remote I/O Communications

Communications cycle time = (Communications cycle time for remote I/O communications only) + 0.11 × $T_B$ + 0.6 (ms)

$T_B$: Baud rate (500 kbps: $T_B$ = 2; 250 kbps: $T_B$ = 4; 125 kbps: $T_B$ = 8)

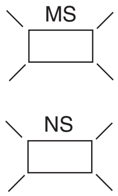
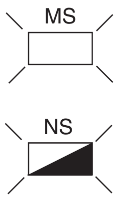
**Note** The above equations can be used to find the approximate message communications time, but not the maximum time. The message communications time will depend on the frequency of the message communications, the load on the remote node, the communications cycle time, and other factors. For any one Master Unit, the message communications time may be greatly increased due to heavy loads.

# SECTION 9
# Troubleshooting and Maintenance

This section describes error processing, periodic maintenance operations, and troubleshooting procedures needed to keep the DeviceNet Network operating properly. We recommend reading through the error processing procedures in both this manual and the operation manual for the master being used before operation so that operating errors can be identified and corrected more quickly.

# 9-1 Indicators and Error Processing

| MS/NS indicators | Details | | Probable cause and remedy |
|---|---|---|---|
| MS ON (green)<br>NS ON (green) | Remote I/O communications or message communications in progress | Remote I/O Communications or message communications in progress | Remote I/O communications and/or message communications are being performed.<br>(Normal status) |
| MS ON (green)<br>NS OFF | Checking for node address duplication | Checking for node address duplication at the Master. | If this indicator status has occurred for only specific Slaves, check that the Slave baud rate settings are correct and then restart them. |
| MS ON (green)<br>NS Flashing (green) | Waiting for connection | Waiting for connection to be established with Master. | |
| MS ON (red)<br>NS OFF | Watchdog timer error | Watchdog timer error has occurred in Slave | Replace the Slave Unit. |
| MS Flashing (red)<br>NS OFF | Switch settings are incorrect. | The DIP switch or other switch settings are incorrect. | Check the switch settings and restart the Slave Unit. |
| MS ON (green)<br>NS ON (red) | Node address duplication | Slave Unit has been assigned the same node address as the Master Unit. | Reset the Slave Unit so that it has a unique node address, and then restart the Slave Unit. |

| MS/NS indicators | Details | | Probable cause and remedy |
|---|---|---|---|
|  MS ON (green)<br>NS ON (red) | Bus Off error detected | Bus Off status (communications stopped due to multiple data errors) | Check the following items and restart the Slave.<br>Do Master/Slave baud rates match?<br>Are lengths of cables (trunk and branch lines) correct?<br>Are cables loose?<br>Are Terminating Resistors connected to both ends of the trunk line only?<br>Is noise interference excessive? |
|  MS ON (green)<br>NS Flashing (red) | Communications time-out. | | Check the following items and restart the Slave.<br>Do Master/Slave baud rates match.<br>Are lengths of cables (trunk and branch lines) correct?<br>Are cables loose?<br>Are Terminating Resistors connected to both ends of the trunk line only?<br>Is noise interference excessive? |

# 9-2 Troubleshooting

## 9-2-1 Troubleshooting by LED Indicators

### Red Indicator (ON or Flashing)

| | |
|---|---|
| MS indicator is a constant red. | The Slave Unit is faulty. Replace the Slave Unit if it is faulty.<br>The Expansion Unit has been removed or disconnected. Check the Expansion Unit. |
| MS indicator is flashing red. | An error has occurred in the Slave's internal non-volatile memory data. Double-click the icon of the Slave in the Main Window and open the Edit Device Parameters Window. Click the **Default Setup** Button, and then click the **Reset** Button. If the MS indicator continues to flash red after returning the data to the default status, replace the Slave Unit.<br>The DIP switch settings or other settings are incorrect. Check the switch settings and restart the Slave Unit.<br>The cold junction compensator has been removed or disconnected (DRT2-TS04T only). Check the cold junction compensator. |

| | |
|---|---|
| After the MS indicator is lit green, the NS indicator changes to red immediately without flashing green. | Check the following points and then restart the faulty Slave.<br>Check for a node address duplication.<br>Check all the node addresses. If required, change settings so that each node has a unique node address.<br>See the troubleshooting steps below under the error heading "The NS indicator lights green but changes to red after a short time."<br>If a particular Slave's NS indicator is always red, replace that Slave. |
| The NS indicator lights green but changes to red after a short time.<br>OR<br>The NS indicator lights green but flashes red after a short time. | Check the following points and then restart the faulty Slave.<br>Make sure that there are 121-Ω Terminating Resistors connected at both ends of the trunk line.<br>Connect 121-Ω Terminating Resistors if the resistance is not correct.<br>Check whether all of the Slaves' settings are correct.<br>Check whether the communications cables are connected properly.<br>Check whether the power supply is set correctly and the power supply cables are connected properly.<br>Check all the nodes for broken wires in the communications and power supply cables attached to the connectors.<br>Check whether communications power is correctly supplied to the network.<br>If there is nearby equipment that generates electrical noise, take steps to shield the Master, Slaves, and communications cables from the noise.<br>If an error has occurred in a network with an OMRON Master Unit, refer to the Master Unit's Operation Manual.<br>If an error has occurred in a network with a another company's Master Unit, refer to the relevant operation manual.<br>If a particular Slave's NS indicator is always red, replace that Slave. |

## Trouble Adding a Slave to the Network

| | |
|---|---|
| The NS indicator remains OFF | Check that the Slave's connector is connected correctly.<br>Check that the Master is operating properly.<br>When using an OMRON Master Unit, refer to the Master Unit's Operation Manual.<br>If another company's Master is being used, refer to the relevant operation manual.<br>Check whether the communications cables are connected properly.<br>Check whether the power supply is set correctly and the power supply cables are connected properly.<br>Check for broken wires in the communications and power supply cables attached to the connectors. |

| | |
|---|---|
| The NS indicator continues to flash green. | Check that the Master is operating properly.<br>When using an OMRON Master Unit, refer to the Master Unit's Operation Manual.<br>If another company's Master is being used, refer to the relevant operation manual.<br>Check whether the Slave is registered in the Master's scan list.<br>If an OMRON Master Unit is being used, a new Slave cannot be added to the network if the Master is operating with the scan list enabled.<br>First clear the scan list, check that all the Slaves have joined the network, and then create the scan list.<br>If another company's Master is being used, refer to the relevant operation manual for details on registering a new Slave in its scan list. |
| The NS indicator alternates between being a constant green and flashing green OR<br>The NS indicator alternates between flashing red and flashing green | When using an OMRON Master Unit, check the following points and perform the error processing steps according to the indicator status.<br>Register the scan list again.<br>First clear the scan list, check that all the Slaves have joined the network, and then create the scan list.<br>Check that the Slave's allocated I/O Area does not overlap with that of another Slave. If there is an overlap, change the Slave's node address to eliminate the overlap.<br>Check that the allocated I/O Area does not exceed the allowable range shown below. If the I/O Area exceeds this range, change the Slave's node address to correct the problem.<br>When using another company's Master Unit, check that the I/O size registered in the Master's scan list matches the actual I/O size of the Slave.<br>The I/O size is recorded in the following attributes of the Connection Object:<br>Interface 2 (Polled I/O Connection)<br>Interface 4 (COS/cyclic Connection)<br>Produced Connection Size (input size)<br>Consumed Connection Size (output size)<br>and:<br>Interface 3 (Bit-strobed I/O Connection)<br>Produced Connection Size (input size)<br><br>Refer to *Appendix B Using Another Company's Master Unit*, and register the correct values in the Master Unit's scan list.<br>Refer to the Master Unit's operation manual for details on registering values. |

## 9-2-2 Troubleshooting by Slave Model

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring all Slaves | MS and NS indicators are a constant red. | See *9-2-1 Troubleshooting by LED Indicators*. | --- |
| | The Network Power Voltage Error Flag does not go ON even when the network power supply voltage drops. | The network power voltage monitor value is set too low. (The default setting is 11 V.) | Increase the network power voltage monitor value. |
| | The appropriate network power supply voltage is being supplied, but a Network Power Voltage Error is still detected. | The network power voltage monitor value is set too high. | Decrease the network power voltage monitor value. |
| | The network power voltage monitor value cannot be set. | The 11 to 25 V setting range has been exceeded. | Set a value within the 11 to 25 V setting range. |
| | The I/O comment or Unit comment cannot be set. | A comment longer than 32 characters is being set. | Set a comment up to 32 characters long. |
| | The Unit Maintenance or Connected Device Maintenance Status Flag will not go ON. | The maintenance status function is disabled if the monitor value is set to 0. | Set the monitor value to a non-zero value. |
| | One of the following values was not held at its previous value when the Unit's power was turned ON again.<br>General-purpose Slaves: Unit Conduction Time or Maintenance Counter value<br>Temperature Input Terminals: Temperature Range Total Time or Top/Valley Count value | When the power is ON, these values are saved to the Unit's non-volatile memory once every 6 minutes.<br>The Save Maintenance Counter function can be used to save these values immediately. If the power is turned OFF without saving the values, the last stored values (up to 6 minutes old) will be read. | Execute the Save Maintenance Counter function before turning OFF the power. |
| Errors occurring in all Slaves except the Analog Slaves | The Maintenance Counter value returned to 0. | The counter is reset to 0 when the Unit is reset.<br>The counter is reset to 0 when the Maintenance Counter setting is switched between Total ON Time Monitor and Contact Operation Counter. | --- |
| | Parameters were edited or set, but some functions were not changed. | The changed function will be enabled only when power is turned OFF and ON again. | Reset the Slave by turning the power OFF and ON, or resetting from the Configurator. |
| | An output is turned ON, but the Maintenance Counter is not incremented. | The I/O power supply is OFF. | Check whether the I/O power supply is being supplied. |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in Slaves that support Expansion Units<br>DRT2-ID16(-1)<br>DRT2-OD16(-1)<br>DRT2-ROS16 | I/O communications could not be used after mounting the Expansion Unit and turning ON the power. | When an Expansion Unit is mounted or removed the number of I/O points changes, so the Master's scan list may not match the actual system. | Set the Master's scan list again. |
| | An Expansion Unit was mounted or removed online and the MS indicator is lit red. | Expansion Units cannot be mounted or removed online | Turn OFF the power before mounting or removing an Expansion Unit. |
| | The Operation Time Monitor function cannot be used. | This function is usable only when an Input Unit and Output Unit are used together.<br>With the DRT2-ID16(-1): Function is usable only when an XWT-OD08(-1) or XWT-OD16(-1) is mounted.<br>With the DRT2-OD16(-1) or DRT2-ROS16:<br>Function is usable only when an XWT-ID08(-1) or XWT-ID16(-1) is mounted.<br>The function is not supported by the DRT2-ID08(-1), DRT2-OD08(-1), DRT2-ID16S, DRT2-HD16C, DRT2-ID08C, or DRT2-OD08C. | --- |
| Errors occurring in Slaves that support the Operation Time Monitor function<br>DRT2-ID16(-1)*<br>DRT2-OD16(-1)*<br>DRT2-ROS16*<br>DRT2-MD16(-1)<br>DRT2-MD16S(-1)<br>DRT2-□D16TA(-1)<br>DRT2-□D16ML(X)(-1)<br>DRT2-□D32ML(-1)<br>DRT2-□D32B/BV(-1)<br>DRT2-□D□□SL/SLH(-1)<br>DRT2-□D04CL(-1)<br>DRT2-MD16CL(-1)<br>* Supported only when an Expansion Unit is mounted and the Slave can be used as an I/O Unit. | The Operation Time Monitor is not showing the expected value. | When the input filter is being used, there will be a delay in the ON time or OFF time.<br>In Slaves other than the Basic, Sensor Connector types, and Environment-resistive Slaves, the operation time can be set to measure from the rising edge or falling edge of the signals. This setting may be incorrect.<br>In Slaves other than the Basic and Sensor Connector types, the operation time combination can be set. If the values are not as expected, this setting may be incorrect. The accuracy is ±6 ms. | Take into account the effect of the filter settings on the Operation Time Monitor or set the filter constants to 0 ms.<br>Recheck the Operation Time edge settings and combination settings in Slaves that support those settings. |
| | The Operation Time Over Flag is going ON and OFF. | The operation time is compared to the monitoring set value and the Operation Time Over Flag is updated for each measurement. Even if this flag turns ON, it will turn OFF the next time it is updated (i.e., for the next measurement) if the operation time is below the monitoring set value.<br>All Slaves except for Standard Slaves and Sensor Connector Slaves have flags that hold status when the monitoring set value is exceeded. | --- |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in Slaves with outputs<br>DRT2-OD08(-1)<br>DRT2-OD16(-1)<br>DRT2-MD16(-1)<br>DRT2-ROS16<br>DRT2-MD16S(-1)<br>DRT2-OD16TA(-1)<br>DRT2-MD16TA(-1)<br>DRT2-OD16ML(X)(-1)<br>DRT2-OD32ML(-1)<br>DRT2-MD32ML(-1)<br>DRT2-OD32B/BV(-1)<br>DRT2-MD32B/BV(-1)<br>DRT2-OD16SL/SLH(-1)<br>DRT2-OD32SL/SLH(-1)<br>DRT2-MD32SL/SLH(-1)<br>DRT2-OD04CL(-1)<br>DRT2-OD08C(-1)<br>DRT2-OD08CL(-1)<br>DRT2-WD16CL(-1)<br>DRT2-MD16CL(-1) | The outputs cannot be held when a communications error has occurred. | The Slave's Output Hold/ Clear setting is set to clear outputs when there is a communications error. | Set the Slave's Output Hold/ Clear setting to hold outputs when there is a communications error. |
| | The outputs cannot be cleared when a communications error has occurred. | The Slave's Output Hold/ Clear setting is set to hold outputs when there is a communications error. | Set the Slave's Output Hold/ Clear setting to clear outputs when there is a communications error. |
| Errors occurring in Slaves with inputs<br>DRT2-ID08(-1)<br>DRT2-ID16(-1)<br>DRT2-MD16(-1)<br>DRT2-MD16S(-1)<br>DRT2-ID16TA(-1)<br>DRT2-MD16TA(-1)<br>DRT2-ID16ML(X)(-1)<br>DRT2-ID32ML(-1)<br>DRT2-MD32ML(-1)<br>DRT2-ID32B/BV(-1)<br>DRT2-MD32B/BV(-1)<br>DRT2-ID16SL/SLH(-1)<br>DRT2-ID32SL/SLH(-1)<br>DRT2-MD32SL/SLH(-1)<br>DRT2-HD16C(-1)<br>DRT2-ID08C(-1)<br>DRT2-ID04CL(-1)<br>DRT2-ID08CL(-1)<br>DRT2-HD16CL(-1)<br>DRT2-MD16CL(-1) | There is a delay in the input's ON or OFF timing. | An input delay may be set in the input filter function. | Either set the input filter value to 0 or an appropriate non-zero input filter value. |
| Errors occurring in Slaves equipped with the Sensor Disconnected Detection function<br>DRT2-HD16C(-1)<br>DRT2-ID08C(-1)<br>DRT2-ID16SLH(-1)<br>DRT2-ID32SLH(-1)<br>DRT2-MD32SLH<br>(-1) | The Sensor Disconnected (Off-wire) Detection Flag is going ON for inputs that are not being used. | The Sensor Disconnected Detection function (Off-wire Detection function) may not be disabled for the inputs that are not being used. | Disable the Sensor Disconnected Detection function (Off-wire Detection function) for inputs that are not being used. |
| Errors occurring in Slaves equipped with the external load short-circuit detection function<br>DRT2-OD08C(-1)<br>DRT2-MD16S(-1)<br>DRT2-OD16SLH(-1)<br>DRT2-OD32SLH-1<br>DRT2-MD32SLH-1 | A short-circuit was corrected after being detected by the external load short-circuit detection function, but the Load Shorted Flag does not go OFF. | The function is set for manual reset. (The default setting is manual reset.) | After correcting the short-circuit, turn the I/O power supply OFF and then ON again. |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in Slaves equipped with the External Load Disconnected Detection function DRT2-OD16SLH(-1) DRT2-OD32SLH(-1) DRT2-MD32SLH(-1) | The Load Disconnected Flag is going ON for outputs that are not being used. | The Load Disconnected Detection function may not be disabled for the outputs that are not being used. | Disable the Load Disconnected Detection function for outputs that are not being used. |
| | The Load Disconnected Flag is going ON for an output even though the load is connected. | The load's current consumption is too low. (The minimum output current is 3 mA.) | Disable the Load Disconnected Detection function. (The function cannot detect disconnection of this load.) |
| | A disconnection was corrected after being detected by the external load disconnected detection function, but the Load Disconnected Flag does not go OFF. | The function is set for manual reset. (The default setting is manual reset.) | After correcting the disconnection, turn the I/O power supply OFF and then ON again. |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in Analog Slaves | The Flag does not go ON even though the monitor value (threshold) has been exceeded. | The function is not enabled for the Analog Smart Slave.<br>If the monitor value is set to 0, the Flag will always be OFF.<br>The input's decimal point position was in the wrong place when the monitor value was set (DRT2-TS04□ only). | Enable the desired function.<br>Set the monitor value to a non-zero value.<br>Check the decimal point position and enter the monitor value again. |
| | The expected input value (or analog output value) is not received even after changing the input type, display mode, and units settings.<br>The function does not operate as expected even after changing data allocated to I/O data and changing the function's Enable Bit. | The new settings will not be reflected without resetting the Slave by turning the power OFF and ON or resetting the Slave from the Configurator. | Either turn the Slave's power OFF and ON or reset the Slave from the Configurator. |
| | The analog data does not have the expected value or there is a large error in the analog value.<br>A disconnection (off-wire condition) is detected even though the device is connected. | I/O data is not allocated to the function correctly.<br>Scaling is being performed.<br>The connected sensor does not match the input type setting.<br>There is a large error in the user adjustment settings.<br>The following conditions apply to Temperature Input Terminals only:<br>The setting for the 1/100 display mode/normal display mode is incorrect.<br>The sensor's decimal point position was read incorrectly.<br>The following conditions apply to the DRT2-TS04T only:<br>The Unit is mounted vertically or face-down.<br>The Unit was replaced, but the Terminal Block was not changed. (The accuracy may be reduced if the components are not replaced as a set.) | Check that the analog data format is correct and I/O data is allocated correctly.<br>If scaling is being performed, check whether the scaling values are correct.<br>If the scaling function has been enabled inadvertently, disable scaling.<br>Check the input type setting.<br>Perform the user adjustment procedure again.<br>The following remedies apply to Temperature Input Terminals only:<br>In normal display mode, the display value is multiplied by ×1 or ×10, depending on the input type setting.<br>In 1/100 display mode, the display value is multiplied by ×100, regardless of the input type setting. Check the settings and input type again.<br>Check the Unit's mounting direction. |
| | The DIP switch settings are ineffective. | Pin 8 of the DIP switch is OFF. (This is the default setting.) | Turn ON pin 8. |
| | The user adjustment and bias compensation settings are not accepted (DRT2-TS04T only). | Adjustment was performed with a input that was outside of the acceptable setting range. | Perform the adjustment procedure again with the correct input voltage (or current).<br>Check the adjustment system and correct if necessary. |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in Analog Slaves (Input)<br>DRT2-AD04<br>DRT2-AD04H<br>DRT2-TS04□ | The off-wire display will not go away. | The sensor is disconnected. | Fix the sensor disconnection. |
| | | The cold junction compensator has been removed (DRT2-TS04T only).<br>The temperature is far outside of the sensor's measurement temperature range.<br>The input type is incorrect for the temperature being measured. | Check the connected sensor, input type setting, and temperature range. |
| | The off-wire display will not appear. | With Analog Input Terminals, the off-wire display will not operate if the input is outside of the 1 to 5 V range or 4 to 20 mA range. | --- |
| | The Top/Valley Detection Timing Flag will not go ON.<br>The Top/Valley Count Over Flag will not go ON (DRT2-TS04T only). | The hysteresis setting is too high.<br>The hysteresis setting is 0. | Adjust the hysteresis setting. |
| | The Top/Valley Detection Timing Flags go ON too frequently.<br>The Top/Valley count is unexpectedly high (DRT2-TS04T only). | The hysteresis setting is too low. | Adjust the hysteresis setting. |
| Errors occurring in the DRT2-AD04 Analog Input Terminal only | The conversion cycle is too long. | The number of AD conversion points is set to the maximum (4 points).<br>The processing time is longer for each additional function. | If there are unneeded inputs, reduce the number of points.<br>If there are unused functions, delete those functions. |
| Errors occurring in the DRT2-DA02 Analog Output Terminal only | The expected value is not held when a communications error occurs. | The output hold/clear setting is incorrect. | Check the output hold/clear setting. |

| Model | Details | Probable cause | Remedy |
|---|---|---|---|
| Errors occurring in the DRT2-TS04□ Temperature Input Terminal only | The 1/100 display mode has been set, but the display reads 0. | The allocated word is a one-word normal display area. | Either change the default connection path to a 1/100 display area or select a connection path in the Master for the 1/100 display area. |
| | The temperature difference detected by the Data Comparison between Channels function is not rising properly. | A value other than the temperature value is allocated to analog data 2.<br>(The temperature difference display is always a 1/100 display.) | Allocate the temperature value to analog data 2. |
| | The Zone Counter is not counting even though the temperature value is set as the count condition. | The Comparator function is not enabled as a function type. | Enable the Comparator function. (The power must be turned OFF and then ON again.) |
| | The Top/Valley Count Over Flag will not go ON (DRT2-TS04T only). | The Top/Valley function is not enabled as a function type.<br>The hysteresis setting is too high.<br>The hysteresis setting is 0. | Enable the Top/Valley function. (The power must be turned OFF and then ON again.)<br>Adjust the hysteresis setting. |
| | The Comparator function does not operate as expected even though the function and hysteresis value have been set. | The temperature display setting has been switched (°C to °F or vice versa).<br>The decimal point position was read incorrectly. | Check the decimal point position and °C/°F display for the input type and display mode. If these settings have been changed during operation, check the Comparator function and hysteresis settings and correct if necessary. |

# 9-3 Maintenance

This section describes the routine cleaning and inspection recommended as regular maintenance. Handling methods when replacing Units are also explained here.

## 9-3-1 Cleaning

Clean the DeviceNet Units regularly as described below in order to keep the Network in its optimal operating condition.

- Wipe the Unit with a dry, soft cloth for regular cleaning.
- When dust or dirt cannot be removed with a dry cloth, dampen the cloth with a neutral cleanser (2%), wring out the cloth, and wipe the Unit.
- Smudges may remain on the Unit from gum, vinyl, or tape that was left on for a long time. Remove these smudges when cleaning.

**Note** Never use volatile solvents such as paint thinner or benzene, or chemical wipes to clean the Unit. These substances may damage the surface of the Unit.

## 9-3-2 Inspection

Inspect the system periodically to keep it in its optimal operating condition.

In general, inspect the system once every 6 to 12 months, but inspect more frequently if the system is used in high-temperature, humid,- or dusty conditions.

### Inspection Equipment

Prepare the following equipment before inspecting the system.

**Equipment Required for Regular Inspection**

A flat-blade and a Phillips screwdriver, a screwdriver for connecting communications connectors, a tester (or a digital voltmeter), industrial alcohol, and a clean cloth are required for routine inspection.

**Other Equipment that May Be Required**

A synchroscope, oscilloscope, thermometer, or hygrometer may be required.

### Inspection Procedure

Check the items in the following table and correct any condition that is below standard.

| Inspection item | Details | Standard | Equipment |
|---|---|---|---|
| Environmental conditions | Are ambient and cabinet temperatures correct? | Refer to the specifications for each Slave. | Thermometer |
| | Are ambient and cabinet humidity correct? | Refer to the specifications for each Slave. | Hygrometer |
| | Has dust or dirt accumulated? | No dust or dirt | Visual inspection |
| Installation conditions | Are the Units installed securely? | No looseness | Phillips screwdriver |
| | Are the connectors of the communications cables fully inserted? | No looseness | Phillips screwdriver |
| | Are the external wiring screws tight? | No looseness | Phillips screwdriver |
| | Are the connecting cables undamaged? | No external damage | Visual inspection |

## 9-3-3 Replacing Units

The Network consists of the DeviceNet Master Unit and Slave Units. The entire network is affected when a Unit is faulty, so a faulty Unit must be repaired or replaced quickly. We recommend having spare Units available to restore Net-work operation as quickly as possible.

### Precautions

Observe the following precautions when replacing a faulty Unit.

After replacement make sure that there are no errors with the new Unit.

When a Unit is being returned for repair, attach a sheet of paper detailing the problem and return the Unit to your OMRON dealer.

If there is a faulty contact, try wiping the contact with a clean, lint-free cloth dampened with alcohol.

### Settings after Replacing Units

After replacing a Unit, set the new Unit's switches to the same settings that were on the old Unit.

# Appendix A
## DeviceNet Explicit Messages

DeviceNet explicit messages sent from the Master Unit to a DRT2-series Smart Slave can be used to read or write any parameter of a specified Smart Slave.

The Smart Slaves process the commands sent from the Master and then return responses.

# Basic Format of Explicit Messages

The basic format of each command and response is shown below.

## Command Block

| Destination node address | Service code | Class ID | Instance ID | Attribute ID | Data |
|---|---|---|---|---|---|

### Destination Node Address

The node address of the Unit that is sending the explicit messages (commands) is specified as a single-byte hexadecimal.

### Service Code, Class ID, Instance ID, Attribute ID

The parameters used for specifying the command, processing object, and processing content.

**Note** The number of bytes designated for Class ID, Instance ID, and Attribute ID depend on the Master Unit. When sent from an OMRON DeviceNet Master, the Class ID and Instance ID are 2 bytes (4 digits), and Attribute ID is 1 byte (2 digits).

### Data

Data is not required when the read command is used.

## Response Block

### Normal Response Block

| Number of bytes received | Source node address | Service code | Data |
|---|---|---|---|

### Error Response Block

| Number of bytes received:<br>0004 Hex (fixed) | Source node address | Service code | Error code |
|---|---|---|---|

### Number of Bytes Received

The number of bytes received from the source node address is returned in hexadecimal. When an error response is returned for an explicit message, the number of bytes is always 0004 Hex.

### Source Node Address

The node address of the node from which the command was sent is returned in hexadecimal.

## Service Code

For normal completion, the value when the leftmost bit of the service code specified in the command turns ON is stored as shown in the following table.

| Function | Command service code | Response service code |
|---|---|---|
| Write data | 10 Hex | 90 Hex |
| Read data | 0E Hex | 8E Hex |
| Reset | 05 Hex | 85 Hex |
| Save | 16 Hex | 96 Hex |

When an error response is returned for an explicit message, the value is always 94 Hex.

## Data

Read data is included only when a read command is executed.

## Error Codes

The explicit message error code. For details, refer to the list of error codes in the following table.

## List of Error Codes

| Response code | Error name | Cause |
|---|---|---|
| 08FF | Service not supported | The Service code is incorrect. |
| 09FF | Invalid attribute value | The specified Attribute value is not supported.<br>The data written was outside valid range. |
| 16FF | Object does not exist | The specified Instance ID is not supported. |
| 15FF | Too much data | The data is larger than the specified size. |
| 13FF | Not enough data | The data is smaller than the specified size. |
| 0CFF | Object state conflict | The specified command cannot be executed due to an internal error. |
| 20FF | Invalid parameter | The specified operation command data is not supported. |
| 0EFF | Attribute not settable | An Attribute ID supported only for reading has been executed for a write service code. |
| 10FF | Device state conflict | The specified command cannot be executed due to an internal error. |
| 14FF | Attribute not supported | The specified Attribute is not supported. |
| 19FF | Store operation failure | The data cannot be stored in memory. |
| 2AFF | Group 2 only server general failure | The specified command or Attribute is not supported or the Attribute was not set. |

# Explicit Messages Common to All Slaves

## Reading General Status

| Explicit message | Read/write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| General Status Read | Read | Reads the specified Slave's status flags (8 bits). | 0E Hex | 95 Hex | 01 Hex | 65 Hex | --- | 1 byte |

**Note** Refer to *3-2-2 I/O Allocations for Smart Slaves* for information on the Generic Status Flags

## Setting and Monitoring the Unit Conduction Time

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Unit Maintenance Set Value | Read | Reads the set value for Unit Conduction Time (unit: 0.1 hr) | 0E Hex | 95 Hex | 01 Hex | 73 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| | Write | Writes the set value for Unit Conduction Time (unit: 0.1 hr) | 10 Hex | 95 Hex | 01 Hex | 73 Hex | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) | --- |
| Unit Maintenance Present Value | Read | Reads the present value for Unit Conduction Time (unit: 0.1 hr) | 0E Hex | 95 Hex | 01 Hex | 71 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| Unit Maintenance Flag | Read | Reads the monitor status of Unit Conduction Time | 0E Hex | 95 Hex | 01 Hex | 72 Hex | --- | 1 byte<br>00 Hex: Within range<br>01 Hex: Out of range (over the monitor value) |

# Explicit Messages for General-purpose and Environment-resistive Slaves

## Setting and Monitoring the Terminal (Input)

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Terminal Maintenance Information Monitor Mode | Read | Reads the monitor mode for maintenance information of the input (No. 1 to 32) specified by the Instance ID. | 0E Hex | 08 Hex | 01 to 20 Hex | 65 Hex | --- | 1 byte<br>00 Hex: Total ON time mode<br>01 Hex: Contact operation counter mode |
| | Write | Writes the monitor mode for maintenance information of the input (No. 1 to 32) specified by the Instance ID. | 10 Hex | 08 Hex | 01 to 20 Hex | 65 Hex | 1 byte<br>00 Hex: Total ON time mode<br>01 Hex: Contact operation counter mode | --- |

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Set value (input) for Total ON Time or Contact Operation Counter | Read | Reads the set value for the total ON time (unit: s) or number of contact operations (unit: operations) of the input (No. 1 to 32) specified by the Instance ID. | 0E Hex | 08 Hex | 01 to 20 Hex | 68 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| | Write | Writes the set value for the total ON time (unit: s) or number of contact operations (unit: operations) of the input (No. 1 to 32) specified by the Instance ID. | 10 Hex | 08 Hex | 01 to 20 Hex | 68 Hex | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) | --- |
| Total ON Time or Contact Operation Counter (Input) Read | Read | Reads the total ON time (unit: s) or number of contact operations (unit: operations) for the input (No. 1 to 32) specified by the Instance ID. | 0E Hex | 08 Hex | 01 to 20 Hex | 66 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| Total ON Time or Contact Operation Counter (Input) Reset | Reset | Resets the total ON time (unit: s) or number of contact operations (unit: operations) for the input (No. 1 to 32) specified by the Instance ID. | 05 Hex | 08 Hex | 01 to 20 Hex | 66 Hex | --- | --- |
| Monitor Status for Total ON Time or Contact Operation Counter (Input) Read | Read | Reads the monitor status for total ON time or number of contact operations for the input (No. 1 to 32) specified by the Instance ID. | 0E Hex | 08 Hex | 01 to 20 Hex | 67 Hex | --- | 1 byte<br>00 Hex: Within range<br>01 Hex: Out of range (over the monitor value) |

## Setting and Monitoring the Terminal (Output)

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Terminal Maintenance Information Monitor Mode | Read | Reads the monitor mode for maintenance information of the output (No. 1 to 32) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 20 Hex | 65 Hex | --- | 1 byte<br>00 Hex: Total ON time mode<br>01 Hex: Contact operation counter mode |
| | Write | Writes the monitor mode for maintenance information of the output (No. 1 to 32) specified by the Instance ID. | 10 Hex | 09 Hex | 01 to 20 Hex | 65 Hex | 1 byte<br>00 Hex: Total ON time mode<br>01 Hex: Contact operation counter mode | --- |
| Set Value for Total ON Time or Contact Operation Counter (Output) | Read | Reads the set value for the total ON time (unit: s) or number of contact operations (unit: operation) for the output (No. 1 to 32) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 20 Hex | 68 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| | Write | Writes the set value for the total ON time (unit: s) or number of contact operations (unit: operation) for the output (No. 1 to 32) specified by the Instance ID. | 10 Hex | 09 Hex | 01 to 20 Hex | 68 Hex | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) | --- |
| Total ON Time or Contact Operation Counter (Output) Read | Read | Reads the total ON time (unit: s) or number of contact operations (unit: operation) for the output (No. 1 to 32) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 20 Hex | 66 Hex | --- | 4 bytes<br>00000000 to FFFFFFFF Hex<br>(0 to 4294967295) |
| Reset for Total ON Time or Contact Operation Counter (Output) Reset | Reset | Resets the total ON time (unit: s) or number of contact operations (unit: operation) for the output (No. 1 to 32) specified by the Instance ID to 0. | 05 Hex | 09 Hex | 01 to 20 Hex | 66 Hex | --- | --- |
| Monitor Status for Total ON Time or Contact Operation Counter (Output) Read | Read | Reads the monitor status for total ON time or contact operation counter for the output (No. 1 to 32) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 20 Hex | 67 Hex | --- | 1 byte<br>00 Hex: Within range<br>01 Hex: Out of range (over the monitor value) |

## Setting and Monitoring Operation Time

### Basic I/O Unit + Expansion Unit/Sensor Connector I/O Terminal

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Set Value for Operation Time Monitor | Read | Reads the monitor value for the time (unit: ms) an output (No. 1 to 16) specified by the Instance ID turns ON until the corresponding input turns ON. | 0E Hex | 97 Hex | 01 to 10 Hex | 67 Hex | --- | 2 bytes<br>0000 to FFFF Hex<br>(0 to 65535) |
| | Write | Writes the monitor value for the time (unit: ms) an output (No. 1 to 16) specified by the Instance ID turns ON until the corresponding input turns ON. | 10 Hex | 97 Hex | 01 to 10 Hex | 67 Hex | 2 bytes<br>0000 to FFFF Hex<br>(0 to 65535) | --- |
| Present Value for Operation Time Monitor | Read | Reads the present value for the time (unit: ms) an output (No. 1 to 16) specified by the Instance ID turns ON until the corresponding input turns ON. | 0E Hex | 97 Hex | 01 to 10 Hex | 65 Hex | --- | 2 bytes<br>0000 to FFFF Hex<br>(0 to 65535) |
| Monitor Status Value for Operation Time Monitor Read | Read | Reads the monitor status for the time (unit: ms) an output (No. 1 to 16) specified by the Instance ID turns ON until the corresponding input turns ON. | 0E Hex | 97 Hex | 01 to 10 Hex | 66 Hex | --- | 1 byte<br>00 Hex: Within range<br>01 Hex: Out of range (over the monitor value) |

### Three-tier Terminal Block Terminal, MIL Connector Terminal, Board Terminal, and Screw-less Clamp Terminal

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Operation Time Monitor Peak Value Read | Read | Reads the peak value for the time (unit: ms) from the start point trigger until the end point trigger specified by the Instance ID (No. 1 to 8). | 0E Hex | 97 Hex | 01 to 08 Hex | 68 Hex | --- | 2 bytes<br>0000 to FFFF Hex<br>(0 to 65535) |
| Operation Time Monitor Peak Value Reset | Reset | Resets to the present value the peak value for the time (unit: ms) from the start point trigger until the end point trigger specified by the Instance ID (No. 1 to 8) | 05 Hex | 97 Hex | 01 to 08 Hex | 68 Hex | --- | --- |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Operation Time Monitor History | Read | Reads the monitor history for the time (unit: ms) from the start point trigger until the end point trigger specified by the Instance ID (No. 1 to 8). | 0E Hex | 97 Hex | 01 to 08 Hex | 6D Hex | --- | 1 byte<br>00 Hex: Value not exceeded<br>01 Hex: Value exceeded |
| Operation Time Monitor History Reset | Read | Resets the monitor history for the time (unit: ms) from the start point trigger until the end point trigger specified by the Instance ID (No. 1 to 8) to 0. | 05 Hex | 97 Hex | 01 to 08 Hex | 6D Hex | --- | --- |

## Setting Hold/Clear for Communications Errors (Output)

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Setting for Output Status (Hold or Clear) after Communications Error | Read | Reads whether hold or clear is set as the output status after a communications error for an output (No. 1 to 32) specified by the Instance ID. The setting can be read for a specified number of points. | 0E Hex | 09 Hex | 01 to 20 Hex | 05 Hex | --- | 1 byte<br>00 Hex: Clear<br>01 Hex: Hold |
| Setting for Output Status (Hold or Clear) after Communications Error | Write | Sets whether hold or clear is set as the output status after a communications error for an output (No. 1 to 32) specified by the Instance ID. The setting can be set for a specified number of points. | 10 Hex | 09 Hex | 01 to 20 Hex | 05 Hex | 1 byte<br>00 Hex: Clear<br>01 Hex: Hold | --- |

**Note** The default setting is for all outputs to be cleared (0).

## Setting and Monitoring Detection of Sensor Power Short-circuit

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Sensor Power Short-circuit Status (Environment-resistive Terminal Input Units, Screw-less Clamp Input and I/O Units only) | Read | Reads the short-circuit status of sensor power for the input (No. 1 to 32) specified by the Instance ID.<br>**Note:** For DRT2-HD16C(-1), the same information is read for the two inputs in the same connector. | 0E Hex | 08 Hex | 01 to 20 Hex | 69 Hex | --- | 1 byte<br>00 Hex: Operating normally<br>01 Hex: Shorted |
| Sensor Power Short-circuit Status (Sensor Connector Terminals only) | Read | Reads the short-circuit status of sensor power. | 0E Hex | 95 Hex | 01 Hex | 7D Hex | --- | 1 byte<br>00 Hex: Operating normally<br>01 Hex: Shorted |
| Sensor Power Short-circuit Status for All Sensors Read at Once (Environment-resistive Terminal Input Units, Screw-less Clamp Input and I/O Units only) | Read | Reads the short-circuit status of sensor power for all sensors.<br>**Note:** For DRT2-HD16C(-1), reads the status for each input connector. | 0E Hex | 1D Hex | 01 Hex | 67 Hex | --- | 1 byte, 2 bytes, 4 bytes<br>00 Hex: Operating normally<br>Other values: The sensor power has shorted for the corresponding terminal (connector 1 to 32: bit 00 to 31). (See note.) |

**Note** Response data size: 1 byte for Environment-resistive Terminals, 2 bytes for 16-input Clamp Terminals, and 4 bytes for 32-input Clamp Terminals.

## Setting and Monitoring Sensor Disconnected Detection

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Sensor Disconnected Setting (Environment-resistive Terminal Input Units, Screw-less Clamp Input and I/O Units only) | Read | Reads the setting status for sensor disconnection for the input (No. 1 to 32) specified by the Instance ID.<br>**Note:** For DRT2-HD16C(-1), the same setting is used for the two inputs in the same connector. | 0E Hex | 08 Hex | 01 to 20 Hex | 6B Hex | --- | 1 byte<br>00 Hex: Disabled (not used)<br>01 Hex: Enabled (used) |
| | Write | Writes the setting for the sensor detection for the input (No. 1 to 32) specified by the Instance ID.<br>**Note:** For DRT2-HD16C(-1), the same setting is used for the two inputs in the same connector. For example, input 0 and input 1 share the same setting. If input 0 and input 1 are assigned different settings, the last input setting will be used for both inputs. | 10 Hex | 08 Hex | 01 to 20 Hex | 6B Hex | 1 byte<br>00 Hex: Disabled (not used)<br>01 Hex: Enabled (used) | --- |
| Sensor Disconnected Status Read (Environment-resistive Terminal Input Units, Screw-less Clamp Input and I/O Units only) | Read | Reads the sensor connected/disconnected status for the input (No. 1 to 32) specified by the Instance ID.<br>**Note:** For DRT2-HD16C(-1), the same information is read for the two inputs in the same connector. | 0E Hex | 08 Hex | 01 to 20 Hex | 6A Hex | --- | 1 byte<br>00 Hex: Connected (or no detection setting)<br>01 Hex: Disconnected |
| Sensor Disconnected Status for All Sensors Read at Once (Environment-resistive Terminal Input Units, Screw-less Clamp Input and I/O Units only) | Read | Reads the sensor connected/disconnected status for all sensors at once.<br>**Note:** For DRT2-HD16C(-1), reads the status for each input connector. | 0E Hex | 1D Hex | 01 Hex | 68 Hex | --- | 1 byte, 2 bytes, 4 bytes<br>00 Hex: Operating normally<br>Other values: The sensor of the corresponding input connector is disconnected (connectors 1 to 32: bits 00 to 31) (See note.) |

**Note** Response data size: 1 byte for Environment-resistive Terminals, 2 bytes for 16-input Clamp Terminals, and 4 bytes for 32-input Clamp Terminals.

## Monitoring External Load Short-circuit Detection

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| External Load Short-circuit Detection Status (Environment-resistive Terminal Output Units only) | Read | Reads the external load short-circuit status of the output (No. 1 to 8) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 08 Hex | 69 Hex | --- | 1 byte<br>00 Hex: Operating normally<br>01 Hex: Shorted |
| External Load Short-circuit Detection Status (Sensor Connector Terminal<br>I/O Units only) | Read | Reads the external load short-circuit status for Sensor Connector Terminals. | 01 Hex | 95 Hex | 01 Hex | 7D Hex | --- | 1 byte<br>00 Hex: Error<br>10 Hex: Shorted |
| External Load Short-circuit Detection Status for All Outputs Read at Once (Environment-resistive Terminal Output Units only) | Read | Reads the load short-circuit status for all outputs at once. | 0E Hex | 1E Hex | 01 Hex | 64 Hex | --- | 1 byte, 2 bytes<br>00 Hex: Operating normally<br>Other values: Load shorted for corresponding terminal (outputs 0 to 15: bits 0 to 15) |

**Note** Response data size: 1 byte for Environment-resistive Terminals, and 2 bytes for Screw-less Clamp Terminals.

## External Load Disconnected Detection Monitoring

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| External Load Dis-connected Detection Status (Screw-less Clamp Terminal Output and I/O Units only) | Read | Reads the external load disconnection status of the output (No. 1 to 32) specified by the Instance ID. | 0E Hex | 09 Hex | 01 to 20 Hex | 6A Hex | --- | 2 bytes, 4 bytes<br>00 Hex: Operating normally<br>01 Hex: Disconnected |
| External Load Dis-connected Detection Status for All Outputs at Once (Screw-less Clamp Terminal Output and I/O Units only) | Read | Reads the external load disconnection status for all outputs at once. | 0E Hex | 1E Hex | 01 Hex | 68 Hex | --- | 2 bytes, 4 bytes<br>00 Hex: Operating normally<br>Other values: Load disconnected for corresponding terminal (outputs 0 to 31: bits 0 to 31) |

**Note** Response data size: 2 bytes for 16-output Clamp Terminals, and 4 bytes for 32-output Clamp Terminals.

## Writing Maintenance Information

| Explicit message | Read/ write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Maintenance Counter Save | Save | Records the maintenance counter in the Slave's memory. | 16 Hex | 95 Hex | 01 Hex | 75 Hex | --- | --- |

## Reading Operation Time Monitor and Total ON Time/Contact Operation Counter for All Slaves at Once

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Monitor Status for Operation Time Monitor for All Slaves Read at Once | Read | Reads the monitor status for total operation time monitor for all Slaves. | 0E Hex | 95 Hex | 01 Hex | 7E Hex | --- | +00: Response size<br>+01: 02 Hex (fixed)<br>+02: Response area 1<br>+03: Response area 2<br>(See note 1.) |
| Monitor Status for Total ON Time or Contact Operation Counter for All Slaves Read at Once | Read | Reads the monitor status for total ON time or contact operation counter for all Slaves. | 0E Hex | 95 Hex | 01 Hex | 7F Hex | --- | +00: Response size<br>+01: 02 Hex (fixed)<br>+02: Response area 1<br>+03: Response area 2<br>+04: Response area 3<br>+05: Response area 4<br>+06: Response area 5<br>+07: Response area 6<br>+08: Response area 7<br>+09: Response area 8<br>(See note 2.) |

**Note** 1. The Attribute (7E Hex) is bit 6 of the Generic Status and so the size is fixed at 4 bytes and has the following format.

| | | |
|---|---|---|
| +00 | Size, 0002 | Fixed |
| +01 | | |
| +02 | IN+OUT combined, terminals 0 to 7 | The bit turns ON when the set value is exceeded. |
| +03 | IN+OUT combined, terminals 8 to 15 | |

**Note**
- Depending on the Unit size, not all bits are used.
- 14FF is returned for all Units except mixed I/O Units.

2. The Attribute (7F Hex) is bit 7 of the Generic Status and so the size is fixed at 10 bytes and has the following format.

| | | |
|---|---|---|
| +00 | Size, 0008 | Fixed |
| +01 | | |
| +02 | IN Area, terminals 0 to 7 | The bit turns ON when the set value is exceeded. |
| +03 | IN Area, terminals 8 to 15 | |
| +04 | IN Area, terminals 16 to 24 | |
| +05 | IN Area, terminals 25 to 31 | |
| +06 | OUT Area, terminals 0 to 7 | |
| +07 | OUT Area, terminals 8 to 15 | |
| +08 | OUT Area, terminals 16 to 24 | |
| +09 | OUT Area, terminals 25 to 31 | |

**Note** Depending on the Unit size, not all bits are used.

# Explicit Messages for Analog Slaves

## Reading DIP Switch Settings

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| DIP Switch Status Read | Read | Reads the status of the Input/Output Terminals DIP switch. | 0E Hex | 94 Hex | 01 Hex | 68 Hex | --- | 1 byte |

## Setting and Reading for Analog Input Terminals

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Analog Data 1 Value | Read | Reads the value for Analog Data 1. | 0E Hex | 0A Hex | 01 to 04 Hex | 03 Hex | --- | 2 byte |
| Analog Data 2 Value | Read | Reads the value for Analog Data 2. | 0E Hex | 0A Hex | 01 to 04 Hex | 65 Hex | --- | 2 bytes |
| Number of AD Conversion Points Setting | Write/ Read | Sets the number of AD conversion points. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 00 Hex | 64 Hex | 2 bytes | 1 byte |
| Input Range Setting | Write/ Read | Sets the input range.<br>–10 to 10 V: 0<br>0 to 5 V: 1<br>0 to 10 V: 2<br>4 to 20 mA: 3<br>1 to 5 V: 7<br>0 to 20 mA: 8 | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 04 Hex | 1 byte | 1 byte |
| Analog Status Flag Read | Read | Reads the status of the Analog Status Flags.<br>LL = 0; L = 1;<br>Pass signal = 2; H = 3;<br>HH = 4; Valley shot = 5;<br>Top shot = 6;<br>Off-wire detection = 7 | 0E Hex | 0A Hex | 01 to 04 Hex | 66 Hex | --- | 1 byte |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Analog Data 1 Allocation Selection | Write/ Read | Selects the data allocated to Analog Data 1.<br>Analog input value: 0; Peak value: 1; Bottom value: 2; Top value: 3; Valley value: 4; Rate of change value: 5 | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 68 Hex | 1 byte | 1 byte |
| Analog Data 2 Allocation Selection | Write/ Read | Selects the data allocated to Analog Data 2.<br>Analog input value: 0; Peak value: 1; Bottom value: 2; Top value: 3; Valley value: 4; Rate of change value: 5 | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 69 Hex | 1 byte | 1 byte |
| Function Setting | Write/ Read | Sets each function.<br>Bit status: ON: Enabled, OFF: Disabled<br>Moving average: 0; Scaling: 1; Peak/bottom hold: 2; Top/valley hold: 3; Comparator: 4; Cumulative counter: 5; Rate of change: 6 | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 6E Hex | 1 byte | 1 byte |
| Scaling Type Setting | Write/ Read | Default scaling: 0: User scaling: 1 | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 6F Hex | 1 byte | 1 byte |
| Scaling Point 1 Setting | Write/ Read | Sets an analog value as the 0% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 70 Hex | 2 bytes (–28000 to 28000) | 2 bytes (–28000 to 28000) |
| Scaling Point 2 Setting | Write/ Read | Sets an analog value as the 100% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 71 Hex | 2 bytes (–28000 to 28000) | 2 bytes (–28000 to 28000) |
| Offset Compensation | Write/ Read | Compensates for scaling errors with an offset value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 72 Hex | 2 bytes (–28000 to 28000) | 2 bytes (–28000 to 28000) |
| Maximum Value Read | Read/ Reset | Reads the maximum value after power is turned ON. | Read: 0E Hex<br>Reset: 35 Hex | 0A Hex | 01 to 04 Hex | 73 Hex | --- | 2 bytes |
| Minimum Value Read | Read/ Reset | Reads the minimum value after power is turned ON. | Read: 0E Hex<br>Reset: 35 Hex | 0A Hex | 01 to 04 Hex | 74 Hex | --- | 2 bytes |
| Peak Value Read | Read | The peak value is held and read. | 0E Hex | 0A Hex | 01 to 04 Hex | 75 Hex | --- | 2 bytes |
| Bottom Value Read | Read | The bottom value is held and read. | 0E Hex | 0A Hex | 01 to 04 Hex | 76 Hex | --- | 2 bytes |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Top Value Read | Read | The top value is held and read. | 0E Hex | 0A Hex | 01 to 04 Hex | 77 Hex | --- | 2 bytes |
| Top Detection Timing Flag Read | Read | Reads the timing for detecting top values. | 0E Hex | 0A Hex | 01 to 04 Hex | 78 Hex | --- | 1 byte |
| Valley Value Read | Read | The valley value is held and read. | 0E Hex | 0A Hex | 01 to 04 Hex | 79 Hex | --- | 2 bytes |
| Valley Detection Timing Flag Read | Read | Reads the timing for detecting valley values. | 0E Hex | 0A Hex | 01 to 04 Hex | 7A Hex | --- | 1 byte |
| HH Value Setting | Write/ Read | Sets the HH value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 7D Hex | 2 bytes (–32768 to 32767) | 2 bytes (–32768 to 32767) |
| LL Value Setting | Write/ Read | Sets the LL value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 7E Hex | 2 bytes (–32768 to 32767) | 2 bytes (–32768 to 32767) |
| H Value Setting | Write/ Read | Sets the H value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 7F Hex | 2 bytes (–32768 to 32767) | 2 bytes (–32768 to 32767) |
| L Value Setting | Write/ Read | Sets the L value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 80 Hex | 2 bytes (–32768 to 32767) | 2 bytes (–32768 to 32767) |
| Scaled Analog Input Value Read | Read | Reads analog input values for which have only been scaled. | 0E Hex | 0A Hex | 01 to 04 Hex | 8D Hex | --- | 2 bytes |
| Rate of Change Value Read | Read | Reads the rate of change for each sampling cycle. | 0E Hex | 0A Hex | 01 to 04 Hex | 8E Hex | --- | 2 bytes |
| Sampling Cycle Setting | Write/ Read | Sets the sampling cycle for obtaining the rate of change based on the previous value. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 90 Hex | DRT2-AD04: 2 bytes (10 to 65535)<br>DRT2-AD04H: 2 bytes (250 to 65500) | DRT2-AD04: 2 bytes (10 to 65535)<br>DRT2-AD04H: 2 bytes (250 to 65500) |
| Cumulated Value Read | Read/ Reset | Reads the cumulated analog input value. | Read: 0E Hex<br>Reset: 35 Hex | 0A Hex | 01 to 04 Hex | 91 Hex | --- | 4 bytes (–214748364.8 to 214748364.7) |
| Cumulative Counter Flag Read | Read | Reads the cumulative count status in the Cumulative Counter Flag in the area for Generic Status Flags.<br>0: Counter overflow<br>1: Counter underflow<br>7: Set value overflow | Read: 0E Hex | 0A Hex | 01 to 04 Hex | 92 Hex | --- | 1 byte |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Cumulative Counter Monitor Value Setting | Write/ Read | Writes/reads the set monitor value for the cumulative counter. | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 93 Hex | 4 bytes | 4 bytes |
| Cumulative Counter Unit Setting | Write/ Read | Sets the unit for the cumulative counter.<br>0: Hour (count hours); 1: Minute (count minutes) | Write: 10 Hex<br>Read: 0E Hex | 0A Hex | 01 to 04 Hex | 94 Hex | 1 byte | 1 byte |

## Setting and Reading for Analog Output Terminals

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Analog Output Value Read | Read | Reads analog output values. | 0E Hex | 0B Hex | 01 to 02 Hex | 03 Hex | --- | 2 bytes |
| Output Range Setting | Write/ Read | Sets the output range.<br>4 to 20 mA: 0;<br>0 to 10 V: 1;<br>0 to 20 mA: 2;<br>–10 to 10 V: 3;<br>0 to 5 V: 4;<br>1 to 5 V: 6 | 0E Hex | 0B Hex | 01 to 02 Hex | 07 Hex | --- | 1 byte |
| Communications Error Output Setting | Write/ Read | Sets the communications error output value for each output.<br>0: Hold last state<br>1: Low limit<br>2: High limit<br>3: Zero count | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 09 Hex | 1 byte | 1 byte |
| Function Setting | Write/ Read | Sets each function.<br>Bit status:<br>ON: Enabled<br>OFF: Disabled<br>Scaling: 0;<br>Cumulative counter: 1 | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 6E Hex | 1 byte | 1 byte |
| Scaling Type Setting | Write/ Read | Default scaling: 0:<br>User scaling: 1 | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 6F Hex | 1 byte | --- |
| Scaling Point 1 Setting | Write/ Read | Sets a conversion value as the 0% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 70 Hex | --- | --- |
| Scaling Point 2 Setting | Write/ Read | Sets a conversion value as the 100% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 71 Hex | --- | --- |
| Offset Compensation | Write/ Read | Compensates for scaling errors with an offset value. | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 72 Hex | 2 bytes (–28000 to 28000) | 2 bytes (–28000 to 28000) |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Cumulated Value Read | Read/ Reset | Reads the cumulated analog output value. | Read: 0E Hex<br>Reset: 35 Hex | 0B Hex | 01 to 02 Hex | 91 Hex | --- | 4 bytes (–214748364.8 to 214748364.8) |
| Cumulative Counter Flag Read | Read | Reads the cumulative count status in the Cumulative Counter Flag in the area for Generic Status Flags.<br>0: Counter overflow<br>1: Counter underflow<br>7: Set value overflow | Read: 0E Hex | 0B Hex | 01 to 02 Hex | 92 Hex | --- | 1 byte |
| Cumulative Counter Monitor Value Setting | Write/ Read | Writes/reads the set monitor value for the cumulative counter. | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 93 Hex | 4 bytes | 4 bytes |
| Cumulative Counter Unit Setting | Write/ Read | Sets the unit for the cumulative counter.<br>0: Hour (count hours); 1: Minute (count minutes) | Write: 10 Hex<br>Read: 0E Hex | 0B Hex | 01 to 02 Hex | 94 Hex | 1 byte | --- |

## Setting and Reading for Temperature Input Terminals

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Display Format Read (Normal or 1/100) | Read | Reads the display format.<br>Normal display: 1<br>1/100 display: 2 | 0E Hex | 31 Hex | 00 Hex | 64 Hex | --- | 1 byte |
| Temperature 1 Read for Normal Display | Read | Reads the value of temperature data 1. | 0E Hex | 31 Hex | 01 to 04 Hex | A5 Hex | --- | 2 bytes |
| Temperature 2 Read for Normal Display | Read | Reads the value of temperature data 2. | 0E Hex | 31 Hex | 01 to 04 Hex | A6 Hex | --- | 2 bytes |
| Temperature 1 Read for 1/100 Display | Read | Reads the value of temperature data 1. | 0E Hex | 31 Hex | 01 to 04 Hex | A6 Hex | --- | 4 bytes |
| Temperature 2 Read for 1/100 Display | Read | Reads the value of temperature data 2. | 0E Hex | 31 Hex | 01 to 04 Hex | 65 Hex | --- | 4 bytes |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Input Type Set | Write/ Read | Sets the input type.<br>R: 0, S: 1, K1: 2, K2: 3, J1: 4, J2: 5, T: 6, E: 7, L1: 8, L2: 9, U: A, N: B, W: C, B: D, PLII: E, PT: F, JPT: 10, PT2: 11, JPT: 12 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | A2 Hex | 1 byte | 1 byte |
| User Adjustment Check | Read | Checks to see if user adjustment has been performed for the temperature conversion constant.<br>User adjustment: 1<br>Default setting: 0 | 0E Hex | 31 Hex | 1 to 4 Hex | 84 Hex | --- | 1 byte |
| Display Unit Read | Read | Reads the display unit.<br>°C: 1200, °F: 1201 | 0E Hex | 31 Hex | 01 to 04 Hex | 04 Hex | --- | 2 bytes |
| Analog Status Flag Read | Read | Reads the status of the Analog Status Flags.<br>LL = 0; L = 1;<br>Pass signal = 2; H = 3;<br>HH = 4; Valley shot = 5;<br>Top shot = 6;<br>Off-wire detection = 7 | 0E Hex | 31 Hex | 01 to 04 Hex | 66 Hex | --- | 1 byte |
| Temperature Data 1 Allocation Selection | Write/ Read | Selects the data allocated to Temperature Data 1.<br>Temperature input value: 0;<br>Peak value: 1;<br>Bottom value: 2;<br>Top value: 3;<br>Valley value: 4;<br>Rate of change value: 5 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 68 Hex | 1 byte | 1 byte |
| Temperature Data 2 Allocation Selection | Write/ Read | Selects the data allocated to Temperature Data 2.<br>Temperature input value: 0;<br>Peak value: 1;<br>Bottom value: 2;<br>Top value: 3;<br>Valley value: 4;<br>Rate of change value: 5 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 69 Hex | 1 byte | 1 byte |
| Function Setting | Write/ Read | Sets each function.<br>Bit status:<br>ON: Enabled,<br>OFF: Disabled<br>Moving average: 0;<br>Scaling: 1;<br>Peak/bottom hold: 2;<br>Top/valley hold: 3;<br>Comparator: 4;<br>Cumulative counter: 5;<br>Rate of change: 6 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 6E Hex | 2 bytes | 2 bytes |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Scaling Point 1 Setting | Write/ Read | Sets an temperature value as the 0% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 70 Hex | 2 bytes | 2 bytes |
| Scaling Point 2 Setting | Write/ Read | Sets an temperature value as the 100% value for user scaling. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 71 Hex | 2 bytes | 2 bytes |
| Offset Compensation | Write/ Read | Compensates for scaling errors with an offset value. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 72 Hex | 2 bytes | 2 bytes |
| Maximum Value Read | Read/ Reset | Reads the maximum value after power is turned ON. | Read: 0E Hex<br>Reset: 35 Hex | 31 Hex | 01 to 04 Hex | 73 Hex | --- | 4 bytes |
| Minimum Value Read | Read/ Reset | Reads the minimum value after power is turned ON. | Read: 0E Hex<br>Reset: 35 Hex | 31 Hex | 01 to 04 Hex | 74 Hex | --- | 4 bytes |
| Peak Value Read | Read | The peak value is held and read. | 0E Hex | 31 Hex | 01 to 04 Hex | 75 Hex | --- | 4 bytes |
| Bottom Value Read | Read | The bottom value is held and read. | 0E Hex | 31 Hex | 01 to 04 Hex | 76 Hex | --- | 4 bytes |
| Top Value Read | Read | The top value is held and read. | 0E Hex | 31 Hex | 01 to 04 Hex | 77 Hex | --- | 4 bytes |
| Top Detection Timing Flag Read | Read | Reads the timing for detecting top values. | 0E Hex | 31 Hex | 01 to 04 Hex | 78 Hex | --- | 1 byte |
| Valley Value Read | Read | The valley value is held and read. | 0E Hex | 31 Hex | 01 to 04 Hex | 79 Hex | --- | 4 bytes |
| Valley Detection Timing Flag Read | Read | Reads the timing for detecting valley values. | 0E Hex | 31 Hex | 01 to 04 Hex | 7A Hex | --- | 1 byte |
| HH Value Setting | Write/ Read | Sets the HH value. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 11 Hex | 4 bytes (–415000 to 415000) | 4 bytes (–415000 to 415000) |
| LL Value Setting | Write/ Read | Sets the LL value. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 12 Hex | 4 bytes (–415000 to 415000) | 4 bytes (–415000 to 415000) |
| H Value Setting | Write/ Read | Sets the H value. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 15 Hex | 4 bytes (–415000 to 415000) | 4 bytes (–415000 to 415000) |
| L Value Setting | Write/ Read | Sets the L value. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 16 Hex | 4 bytes (–415000 to 415000) | 4 bytes (–415000 to 415000) |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Scaled Tempera-ture Input Value Read | Read | Reads temperature input values for which have only been scaled. | 0E Hex | 31 Hex | 01 to 04 Hex | 8D Hex | --- | 4 bytes (–415000 to 415000) |
| Rate of Change Value Read | Read | Reads the rate of change for each sam-pling cycle. | 0E Hex | 31 Hex | 01 to 04 Hex | 8E Hex | --- | 4 bytes (–415000 to 415000) |
| Sampling Cycle Set-ting | Write/ Read | Sets the sampling cycle for obtaining the rate of change based on the previous value.<br>Set in multiples of 250 ms. (Default: 250 ms) | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 90 Hex | 2 bytes (250 to 65550) | 2 bytes (250 to 65550) |
| Cumulated Value Read | Read/ Reset | Reads the cumulated temperature input value. | Read: 0E Hex<br>Reset: 35 Hex | 31 Hex | 01 to 04 Hex | 91 Hex | --- | 4 bytes (–214748364.8 to 214748364.7) |
| Cumulative Counter Flag Read | Read | Reads the cumulative count status in the Cumulative Counter Flag in the area for Generic Status Flags.<br>0: Counter overflow<br>1: Counter underflow<br>7: Set value overflow | 0E Hex | 31 Hex | 01 to 04 Hex | 92 Hex | --- | 1 byte |
| Cumulative Counter Monitor Value Set-ting | Write/ Read | Writes/reads the set monitor value for the cumulative counter. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 93 Hex | 4 bytes | 4 bytes |
| Cumulative Counter Unit Setting | Write/ Read | Sets the unit for the cumulative counter.<br>0: Hour (count hours); 1: Minute (count minutes) | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | 94 Hex | 1 byte | 1 byte |
| Decimal Position Read | Read | Reads the position of the decimal point.<br>0000 = 0<br>0000.0 = 1<br>0000.00 = 2 | 0E Hex | 31 Hex | 01 to 04 Hex | A3 Hex | --- | 1 byte |
| Top/Valley Count Read | Read/ Reset | Reads the number of tops or valleys that have been counted. | Read: 0E Hex<br>Reset: 35 Hex | 31 Hex | 01 to 04 Hex | A9 Hex | --- | 4 bytes |
| Top/Valley Count Threshold Status Read | Read | Reads whether the top/ valley count has exceeded the threshold value.<br>0: Counter overflow<br>1: Counter underflow<br>7: Set value overflow | 0E Hex | 31 Hex | 01 to 04 Hex | AA Hex | --- | 1 byte |
| Top/Valley Counting Selection | Write/ Read | Selects counting either tops or valleys.<br>Count tops = 0<br>Count valleys = 1 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | AB Hex | 1 byte | 1 byte |

| Explicit message | Read /write | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service code | Class ID | Instance ID | Command data | | |
| | | | | | | Attribute ID | Data | |
| Top/Valley Count Threshold Set | Write/ Read | Sets the threshold value to compare with the top/ valley count. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | AC Hex | 4 bytes | 4 bytes |
| Time in Tempera- ture Range Read | Read/ Reset | Reads (in seconds) the time the system has been in a user-set tem- perature range. | Read: 0E Hex<br>Reset: 35 Hex | 31 Hex | 01 to 04 Hex | AD Hex | 4 bytes | 4 bytes |
| Threshold Status for Time in Tempera- ture Range Read | Read | Compares the time the system has been in a user-set temperature range with a threshold value.<br>0: Timer overflow<br>1: Timer underflow<br>7: Set value overflow | 0E Hex | 31 Hex | 01 to 04 Hex | AE Hex | --- | 1 byte |
| Range for Time in Tempera- ture Range Set | Write/ Read | Sets the range for tim- ing the time in the set temperature range.<br>Above HH = 0,<br>Between HH and H = 1,<br>Pass = 2,<br>Between L and LL = 3,<br>Below LL = 4 | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | AF Hex | 1 byte | 1 byte |
| Threshold for Compar- ison with Time in Tempera- ture Range Set/Read | Write/ Read | Sets (in seconds) the threshold value that is compared to the time in the user-set tempera- ture range. | Write: 10 Hex<br>Read: 0E Hex | 31 Hex | 01 to 04 Hex | B0 Hex | 4 bytes | 4 bytes |
| Input Tem- perature Variation Detection Read | Read | Reads the result of input temperature variation detection. | 0E Hex | 69 Hex | 01 to 06 Hex | 67 Hex | --- | 4 bytes |
| Input Tem- perature Variation Detection Threshold Compare | Read | Compares the input temperature variation detection result with a threshold value and out- puts the result.<br>0: Counter overflow<br>1: Counter underflow<br>6: Invalid data<br>7: Set value overflow | 0E Hex | 69 Hex | 01 to 06 Hex | 68 Hex | --- | 1 byte |
| Input Tem- perature Variation Detection Threshold Set | Write/ Read | Sets the threshold for comparison with the input temperature varia- tion detection result. | Write: 10 Hex<br>Read: 0E Hex | 69 Hex | 01 to 06 Hex | 6E Hex | 4 bytes | 4 bytes |

# Using Explicit Messages

The following example shows how to use explicit messages with Smart Slaves using a CS1W-DRM21 DeviceNet Unit (Master).

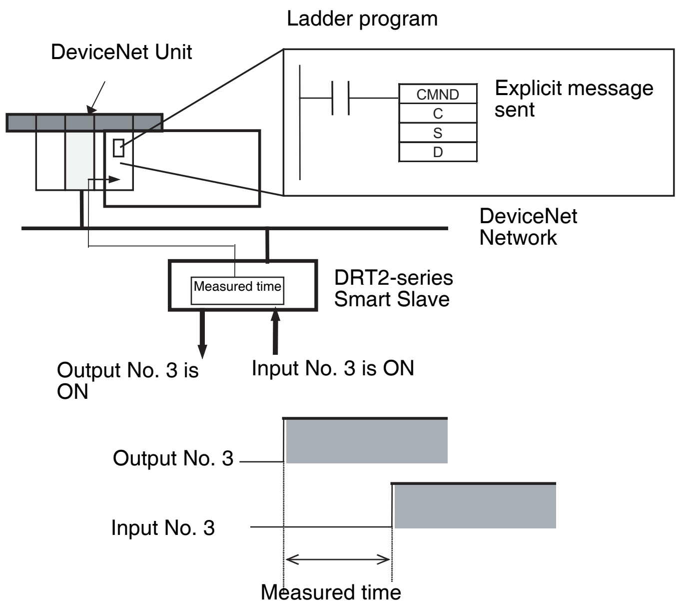
Example: Reading the monitor status for the operation time monitor.

## Example Conditions DeviceNet Unit node address: 05

## Unit number: 0

## Unit address: FE Hex (or 10 Hex)

## Smart Slave node address: 11




### Operation

Reads the measured operation time for contact No. 3 of the Smart Slave (the time from when output No. 3 changes to ON until input No. 3 changes to ON).

The data is read using the EXPLICIT MESSAGE SEND command (2801).

The command data is written in words starting from D01000 in the PLC and the response data is stored in words starting from D02000.

If the command does not end normally, the end code is stored in D00006 and the send command is re-executed.

### Command Details

- [CMND S D C]
  S: D01000
  D (first response word): D02000
  C: D00000

Contents of S

| Address | Contents (Hex) | Meaning |
|---|---|---|
| D01000 | 28 01 | Command code |
| D01001 | 0B 0E | Smart Slave node address: 11<br>Service code: 0E Hex |
| D01002 | 00 97 | Class ID: 0097 Hex |
| D01003 | 00 04 | Instance ID: 0004 Hex |
| D01004 | 66 ** | Attribute ID: 66 ** Hex (Set any value for the blank boxes.) |

Contents of C

| Address | Contents (Hex) | Meaning |
|---|---|---|
| D00000 | 00 09 | Number of bytes of command data |
| D00001 | 00 09 | Number of bytes of response data |
| D00002 | 00 00 | Destination DeviceNet Unit network address: 0 |
| D00003 | 05 FE | Destination DeviceNet Unit node address: 5<br>Destination DeviceNet Unit unit address: FE Hex (or 10 Hex) |
| D00004 | 00 00 | Response required<br>Communications port number: 0<br>Number of retries: 0 |
| D00005 | 00 3C | Response monitoring time: 6 s |

## Response

Contents of D

| Address | Contents (Hex) | Meaning |
|---|---|---|
| D02000 | 28 01 | |
| D02001 | 00 00 | |
| D02002 | 00 02 | |
| D02003 | 0B 8E | Response source node address: 11 (0B Hex)<br>Normal completion: 8E Hex |
| D02004 | 00 00 | Operation time monitor result (0000: Within range)<br>0000<br>Not used.<br>Result is stored. |

# Appendix B
## Using Another Company's Master Unit

This appendix explains how to operate an OMRON Slave when the Slave is connected to a Master manufactured by another company.

**Note** If the Slave has outputs, do not communicate with the Master through a bit strobe connection.
There are several DeviceNet I/O communications methods, including poll and bit strobe connections, but DeviceNet specifications allow the bit strobe connection with inputs only.
OMRON Master Units conform to these specifications and communicate with Output Slaves through a poll connection, but some other company's Masters allow bit strobe connections with Output Slaves. Before connecting an OMRON Slave to another company's Master, verify the Master's connection specifications.

When connecting an OMRON Slave to another company's Master, it may be necessary to install the OMRON Slave's EDS file in the other company's configurator to set the Slave's information in the Master. With some companies' Masters, the Slaves can be connected without making settings.

With some other companies' configurators and depending on the Slave being used, installing the OMRON Slave's EDS file in the configurator will allow you to make various parameter settings from the configurator.

**Note** If you cannot obtain a copy of the EDS file or the other company's configurator does not support EDS files, settings such as the connection type and data size must be input directly.

## Installing EDS Files

EDS files are provided by the manufacturer for each Slave and contain settings such as the Slave's ID and I/O data sizes. If the EDS file is installed in the configurator, the Slave's settings can be changed and the I/O size will be input automatically when the Master's scan list is created.

EDS files for the Slaves described in this manual can be downloaded from the product catalog at the following website:

→http://www.odva.org/

Locate the EDS file for the desired Slave and install that EDS file in the configurator. Refer to the configurator's operation manual for details on the installation procedure.

## More Detailed DeviceNet Specifications for Slaves

The following device profiles contain more detailed DeviceNet specifications for Slaves if more information needs to be registered in the scan list.

## Device Profiles of General-purpose and Environment-resistive Slaves

| | | |
|---|---|---|
| General data | Compatible DeviceNet Specifications | Volume I - Release 2.0<br>Volume II - Release 2.0 |
| | Vendor name | OMRON Corporation Vendor ID = 47 |
| | Device profile name | Slaves: General purpose Discrete I/O<br>Profile number = 7 |
| | Manufacturer catalog number | W404 |
| | Manufacturer revision | 1.01 |
| Physical conformance data | Network current consumption | Refer to Appendix E current consumption summary for details. |
| | Connector type | Open plug |
| | Physical insulation | No |
| | Supported indicators | Module, Network |
| | MAC ID setting | Software switch or rotary switch (software switch: No. 64 to 99) |
| | Default MAC ID | 0 |
| | Baud rate setting | None (automatic recognition) |
| | Supported baud rates | 125 kbps, 250 kbps, and 500 kbps |
| Communications data | Predefined Master/Slave connection set | Group 2 only server |
| | Dynamic connection support (UCMM) | No |
| | Explicit message fragmentation support | Yes |

## Device Profiles of Analog Slaves

| | | |
|---|---|---|
| General data | Compatible DeviceNet Specifications | Volume I - Release 2.0<br>Volume II - Release 2.0 |
| | Vendor name | OMRON Corporation Vendor ID = 47 |
| | Device profile name | Slaves: Generic Profile number = 0 |
| | Manufacturer catalog number | W404 |
| | Manufacturer revision | 1.01 |
| Physical conformance data | Network current consumption | Refer to Appendix E current consumption summary for details. |
| | Connector type | Open plug |
| | Physical insulation | Yes |
| | Supported indicators | Module, Network |
| | MAC ID setting | Software switch or rotary switch (software switch: No. 64 to 99) |
| | Default MAC ID | 0 |
| | Baud rate setting | None (automatic recognition) |
| | Supported baud rates | 125 kbps, 250 kbps, and 500 kbps |
| Communications data | Predefined Master/Slave connection set | Group 2 only server |
| | Dynamic connection support (UCMM) | No |
| | Explicit message fragmentation support | Yes |

# Object Mounting

## Identity Object (0x01)

| | | |
|---|---|---|
| **Object class** | **Attribute** | Not supported |
| | **Service** | Not supported |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Object instance** | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
| | | 1 | Vendor | Yes | No | 47 |
| | | 2 | Device type | Yes | No | See note. |
| | | 3 | Product code | Yes | No | See note. |
| | | 4 | Revision | Yes | No | 1.1 |
| | | 5 | Status (bits supported) | Yes | No | Bit 0 only |
| | | 6 | Serial number | Yes | No | Unique for each Unit |
| | | 7 | Product name | Yes | No | See note. |
| | | 8 | State | No | No | --- |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 05 | Reset | No | | |
| | | 0E | Get_Attribute_Single | No | | |

**Note** The product code and product name depend on the type of Slave being used, as shown in the following table.

| **Model** | | **Device type** | **Product code** | **Product name** |
|---|---|---|---|---|
| **Basic Unit** | **Expansion Unit** | | | |
| DRT2-ID16 | None | 07 Hex | 700 | DRT2-ID16 |
| DRT2-ID16 | XWT-ID08 | 07 Hex | 701 | DRT2-ID16 |
| DRT2-ID16 | XWT-ID16 | 07 Hex | 702 | DRT2-ID16 |
| DRT2-ID16 | XWT-OD08 | 07 Hex | 703 | DRT2-ID16 |
| DRT2-ID16 | XWT-OD16 | 07 Hex | 704 | DRT2-ID16 |
| DRT2-ID16 | XWT-ID08-1 | 07 Hex | 705 | DRT2-ID16 |
| DRT2-ID16 | XWT-ID16-1 | 07 Hex | 706 | DRT2-ID16 |
| DRT2-ID16 | XWT-OD08-1 | 07 Hex | 707 | DRT2-ID16 |
| DRT2-ID16 | XWT-OD16-1 | 07 Hex | 708 | DRT2-ID16 |
| DRT2-ID16-1 | None | 07 Hex | 741 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-ID08 | 07 Hex | 742 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-ID16 | 07 Hex | 743 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-OD08 | 07 Hex | 744 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-OD16 | 07 Hex | 745 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-ID08-1 | 07 Hex | 746 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-ID16-1 | 07 Hex | 747 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-OD08-1 | 07 Hex | 748 | DRT2-ID16-1 |
| DRT2-ID16-1 | XWT-OD16-1 | 07 Hex | 749 | DRT2-ID16-1 |
| DRT2-OD16 | None | 07 Hex | 782 | DRT2-OD16 |
| DRT2-OD16 | XWT-ID08 | 07 Hex | 783 | DRT2-OD16 |
| DRT2-OD16 | XWT-ID16 | 07 Hex | 784 | DRT2-OD16 |
| DRT2-OD16 | XWT-OD08 | 07 Hex | 785 | DRT2-OD16 |
| DRT2-OD16 | XWT-OD16 | 07 Hex | 786 | DRT2-OD16 |
| DRT2-OD16 | XWT-ID08-1 | 07 Hex | 787 | DRT2-OD16 |
| DRT2-OD16 | XWT-ID16-1 | 07 Hex | 788 | DRT2-OD16 |
| DRT2-OD16 | XWT-OD08-1 | 07 Hex | 789 | DRT2-OD16 |

| Model | | Device type | Product code | Product name |
|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | |
| DRT2-OD16 | XWT-OD16-1 | 07 Hex | 790 | DRT2-OD16 |
| DRT2-OD16-1 | None | 07 Hex | 823 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-ID08 | 07 Hex | 824 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-ID16 | 07 Hex | 825 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-OD08 | 07 Hex | 826 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-OD16 | 07 Hex | 827 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-ID08-1 | 07 Hex | 828 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-ID16-1 | 07 Hex | 829 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-OD08-1 | 07 Hex | 830 | DRT2-OD16-1 |
| DRT2-OD16-1 | XWT-OD16-1 | 07 Hex | 831 | DRT2-OD16-1 |
| DRT2-ROS16 | None | 07 Hex | 950 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-ID08 | 07 Hex | 951 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-ID16 | 07 Hex | 952 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-OD08 | 07 Hex | 953 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-OD16 | 07 Hex | 954 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-ID08-1 | 07 Hex | 955 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-ID16-1 | 07 Hex | 956 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-OD08-1 | 07 Hex | 957 | DRT2-ROS16 |
| DRT2-ROS16 | XWT-OD16-1 | 07 Hex | 958 | DRT2-ROS16 |
| DRT2-ID08 | | 07 Hex | 878 | DRT2-ID08 |
| DRT2-ID08-1 | | 07 Hex | 879 | DRT2-ID08-1 |
| DRT2-OD08 | | 07 Hex | 880 | DRT2-OD08 |
| DRT2-OD08-1 | | 07 Hex | 881 | DRT2-OD08-1 |
| DRT2-MD16 | | 07 Hex | 876 | DRT2-MD16 |
| DRT2-MD16-1 | | 07 Hex | 877 | DRT2-MD16-1 |
| DRT2-ID16TA | | 07 Hex | 1300 | DRT2-ID16TA |
| DRT2-ID16TA-1 | | 07 Hex | 1301 | DRT2-ID16TA-1 |
| DRT2-OD16TA | | 07 Hex | 1302 | DRT2-OD16TA |
| DRT2-OD16TA-1 | | 07 Hex | 1303 | DRT2-OD16TA-1 |
| DRT2-MD16TA | | 07 Hex | 1304 | DRT2-MD16TA |
| DRT2-MD16TA-1 | | 07 Hex | 1305 | DRT2-MD16TA-1 |
| DRT2-ID16S | | 07 Hex | 870 | DRT2-ID16S |
| DRT2-ID16S-1 | | 07 Hex | 871 | DRT2-ID16S-1 |
| DRT2-MD16S | | 07 Hex | 872 | DRT2-MD16S |
| DRT2-MD16S-1 | | 07 Hex | 873 | DRT2-MD16S-1 |
| DRT2-ID16ML(X) | | 07 Hex | 1397 | DRT2-ID16ML(X) |
| DRT2-ID16ML(X)-1 | | 07 Hex | 1398 | DRT2-ID16ML(X)-1 |
| DRT2-ID32ML | | 07 Hex | 1306 | DRT2-ID32ML |
| DRT2-ID32ML-1 | | 07 Hex | 1307 | DRT2-ID32ML-1 |
| DRT2-OD16ML(X) | | 07 Hex | 1399 | DRT2-OD16ML(X) |
| DRT2-OD16ML(X)-1 | | 07 Hex | 1400 | DRT2-OD16ML(X)-1 |
| DRT2-OD32ML | | 07 Hex | 1308 | DRT2-OD32ML |
| DRT2-OD32ML-1 | | 07 Hex | 1309 | DRT2-OD32ML-1 |
| DRT2-MD32ML | | 07 Hex | 1310 | DRT2-MD32ML |
| DRT2-MD32ML-1 | | 07 Hex | 1311 | DRT2-MD32ML-1 |
| DRT2-ID32B | | 07 Hex | 1315 | DRT2-ID32B |
| DRT2-ID32B-1 | | 07 Hex | 1318 | DRT2-ID32B-1 |
| DRT2-OD32B | | 07 Hex | 1316 | DRT2-OD32B |

| Model | | Device type | Product code | Product name |
|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | |
| DRT2-OD32B-1 | | 07 Hex | 1319 | DRT2-OD32B-1 |
| DRT2-MD32B | | 07 Hex | 1317 | DRT2-MD32B |
| DRT2-MD32B-1 | | 07 Hex | 1320 | DRT2-MD32B-1 |
| DRT2-ID32BV | | 07 Hex | 1321 | DRT2-ID32BV |
| DRT2-ID32BV-1 | | 07 Hex | 1324 | DRT2-ID32BV-1 |
| DRT2-OD32BV | | 07 Hex | 1322 | DRT2-OD32BV |
| DRT2-OD32BV-1 | | 07 Hex | 1325 | DRT2-OD32BV-1 |
| DRT2-MD32BV | | 07 Hex | 1323 | DRT2-MD32BV |
| DRT2-MD32BV-1 | | 07 Hex | 1326 | DRT2-MD32BV-1 |
| DRT2-ID16SL | | 07 Hex | 1003 | DRT2-ID16SL |
| DRT2-ID16SL-1 | | 07 Hex | 1004 | DRT2-ID16SL-1 |
| DRT2-OD16SL | | 07 Hex | 1007 | DRT2-OD16SL |
| DRT2-OD16SL-1 | | 07 Hex | 1008 | DRT2-OD16SL-1 |
| DRT2-ID32SL | | 07 Hex | 1009 | DRT2-ID32SL |
| DRT2-ID32SL-1 | | 07 Hex | 1010 | DRT2-ID32SL-1 |
| DRT2-OD32SL | | 07 Hex | 1013 | DRT2-OD32SL |
| DRT2-OD32SL-1 | | 07 Hex | 1014 | DRT2-OD32SL-1 |
| DRT2-MD32SL | | 07 Hex | 1011 | DRT2-MD32SL |
| DRT2-MD32SL-1 | | 07 Hex | 1012 | DRT2-MD32SL-1 |
| DRT2-ID16SLH | | 07 Hex | 991 | DRT2-ID16SLH |
| DRT2-ID16SLH-1 | | 07 Hex | 992 | DRT2-ID16SLH-1 |
| DRT2-OD16SLH | | 07 Hex | 995 | DRT2-OD16SLH |
| DRT2-OD16SLH-1 | | 07 Hex | 996 | DRT2-OD16SLH-1 |
| DRT2-ID32SLH | | 07 Hex | 997 | DRT2-ID32SLH |
| DRT2-ID32SLH-1 | | 07 Hex | 998 | DRT2-ID32SLH-1 |
| DRT2-OD32SLH | | 07 Hex | 1001 | DRT2-OD32SLH |
| DRT2-OD32SLH-1 | | 07 Hex | 1002 | DRT2-OD32SLH-1 |
| DRT2-MD32SLH | | 07 Hex | 999 | DRT2-MD32SLH |
| DRT2-MD32SLH-1 | | 07 Hex | 1000 | DRT2-MD32SLH-1 |
| DRT2-HD16C | | 07 Hex | 864 | DRT2-HD16C |
| DRT2-HD16C-1 | | 07 Hex | 865 | DRT2-HD16C-1 |
| DRT2-ID08C | | 07 Hex | 866 | DRT2-ID08C |
| DRT2-ID08C-1 | | 07 Hex | 867 | DRT2-ID08C-1 |
| DRT2-OD08C | | 07 Hex | 868 | DRT2-OD08C |
| DRT2-OD08C-1 | | 07 Hex | 869 | DRT2-OD08C-1 |
| DRT2-ID04CL | | 07 Hex | 886 | DRT2-ID04CL |
| DRT2-ID04CL-1 | | 07 Hex | 887 | DRT2-ID04CL-1 |
| DRT2-ID08CL | | 07 Hex | 1376 | DRT2-ID08CL |
| DRT2-ID08CL-1 | | 07 Hex | 1377 | DRT2-ID08CL-1 |
| DRT2-HD16CL | | 07 Hex | 1378 | DRT2-HD16CL |
| DRT2-HD16CL-1 | | 07 Hex | 1379 | DRT2-HD16CL-1 |
| DRT2-OD04CL | | 07 Hex | 888 | DRT2-OD04CL |
| DRT2-OD04CL-1 | | 07 Hex | 889 | DRT2-OD04CL-1 |
| DRT2-OD08CL | | 07 Hex | 1380 | DRT2-OD08CL |
| DRT2-OD08CL-1 | | 07 Hex | 1381 | DRT2-OD08CL-1 |
| DRT2-WD16CL | | 07 Hex | 1382 | DRT2-WD16CL |
| DRT2-WD16CL-1 | | 07 Hex | 1383 | DRT2-WD16CL-1 |
| DRT2-MD16CL | | 07 Hex | 1384 | DRT2-MD16CL |

| Model | | Device type | Product code | Product name |
|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | |
| DRT2-MD16CL-1 | | 07 Hex | 1385 | DRT2-MD16CL-1 |
| DRT2-AD04 | | 00 Hex | 313 | DRT2-AD04 |
| DRT2-DA02 | | 00 Hex | 314 | DRT2-DA02 |
| DRT2-TS04T | | 00 Hex | 335 | DRT2-TS04T |
| DRT2-TS04P | | 00 Hex | 336 | DRT2-TS04P |
| DRT2-AD04H | | 00 Hex | 337 | DRT2-AD04H |

## Message Router Object (0x02)

| | | |
|---|---|---|
| **Object class** | **Attribute** | Not supported |
| | **Service** | Not supported |
| **Object instance** | **Attribute** | Not supported |
| | **Service** | Not supported |
| **Vendor specification addition** | | None |

## DeviceNet Object (0x03)

| | | |
|---|---|---|
| **Object class** | **Attribute** | Not supported |
| | **Service** | Not supported |

| **Object instance** | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
|---|---|---|---|---|---|---|
| | | 1 | MAC ID | Yes | Yes | --- |
| | | 2 | Baud rate | Yes | No | --- |
| | | 3 | BOI | Yes | No | 00 (hexadecimal) |
| | | 4 | Bus Off counter | Yes | No | --- |
| | | 5 | Allocation information | Yes | No | --- |
| | | 6 | MAC ID switch changed | No | No | --- |
| | | 7 | Baud rate switch changed | No | No | --- |
| | | 8 | MAC ID switch value | No | No | --- |
| | | 9 | Baud rate switch value | No | No | --- |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 0E | Get_Attribute_Single | None | | |
| | | 4B | Allocate_Master/ Slave_Connection_Set | None | | |
| | | 4C | Release_Master/ Slave_Connection_Set | None | | |

**Note** SET condition for MAC ID: MAC ID No. 64 to 99.

## Assembly Object (0x04)

| | | |
|---|---|---|
| **Object class** | **Attribute** | Not supported |
| | **Service** | Not supported |

| Object instance | Attribute | ID | Contents | Get (read) | Set (write) | Value |
|---|---|---|---|---|---|---|
| | | 1 | Number of members in list | No | No | --- |
| | | 2 | Member list | No | No | --- |
| | | 3 | Data | Yes | No | --- |
| | Service | DeviceNet service | | Parameter option | | |
| | | 0E | Get_Attribute_Single | None | | |

The assembly instances for DRT2 Slaves are given below.

## General-purpose Slaves (Input)

| Instance number | Type | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Assembly instance 3<br>4 inputs | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID04CL(-1) |
| Assembly instance 4<br>8 inputs | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID08(-1)<br>DRT2-MD16(-1)<br>DRT2-OD16(-1) + XWT-ID08(-1)<br>DRT2-ID08C(-1)<br>DRT2-ID08CL(-1)<br>DRT2-MD16CL(-1)<br>DRT2-ROS16 + XWT-ID08(-1)<br>DRT2-MD16TA(-1)<br>DRT2-MD16S(-1) |
| Assembly instance 5<br>16 inputs | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1)<br>DRT2-ID16(-1) + XWT-OD08(-1)<br>DRT2-ID16(-1) + XWT-OD16(-1)<br>DRT2-OD16(-1) + XWT-ID16(-1)<br>DRT2-HD16C(-1)<br>DRT2-HD16CL(-1)<br>DRT2-ID16S(-1)<br>DRT2-ROS16 + XWT-ID16(-1)<br>DRT2-ID16TA(-1)<br>DRT2-ID16ML(X)(-1)<br>DRT2-ID16SL(-1)<br>DRT2-ID16SLH(-1)<br>DRT2-MD32ML(-1)<br>DRT2-MD32B(-1)<br>DRT2-MD32BV(-1)<br>DRT2-MD32SL(-1)<br>DRT2-MD32SLH(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| Assembly instance 6<br>32 inputs | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) + XWT-ID16(-1)<br>DRT2-ID32ML(-1)<br>DRT2-ID32B(-1)<br>DRT2-ID32BV(-1)<br>DRT2-ID32SL(-1)<br>DRT2-ID32SLH(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | |
| | | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | |
| Assembly instance 7<br>24 inputs | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) + XWT-ID08(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | |
| Assembly instance 100<br>Status flags | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | All models |
| Assembly instance 101<br>8 inputs + status flags | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID04CL(-1)<br>DRT2-ID08(-1)<br>DRT2-MD16(-1)<br>DRT2-OD16(-1) + XWT-ID08(-1)<br>DRT2-ID08C(-1)<br>DRT2-ID08CL(-1)<br>DRT2-MD16CL(-1)<br>DRT2-ROS16 + XWT-ID08(-1)<br>DRT2-MD16TA(-1) |
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |

| Instance number | Type | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Assembly instance 102<br>16 inputs + status flags | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | DRT2-ID16(-1) + XWT-OD08(-1) |
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) + XWT-OD16(-1) |
| | | | | | | | | | | DRT2-OD16(-1) + XWT-ID16(-1) |
| | | | | | | | | | | DRT2-HD16C(-1) |
| | | | | | | | | | | DRT2-HD16CL(-1) |
| | | | | | | | | | | DRT2-ID16S(-1) |
| | | | | | | | | | | DRT2-ROS16 + XWT-ID16(-1) |
| | | | | | | | | | | DRT2-ID16TA(-1) |
| | | | | | | | | | | DRT2-ID16ML(X)(-1) |
| | | | | | | | | | | DRT2-ID16SL(-1) |
| | | | | | | | | | | DRT2-ID16SLH(-1) |
| | | | | | | | | | | DRT2-MD32ML(-1) |
| | | | | | | | | | | DRT2-MD32B(-1) |
| | | | | | | | | | | DRT2-MD32BV(-1) |
| | | | | | | | | | | DRT2-MD32SL(-1) |
| | | | | | | | | | | DRT2-MD32SLH(-1) |
| Assembly instance 103<br>24 inputs + status flags | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) + XWT-ID08(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | |
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| Assembly instance 104<br>32 inputs + status flags | Input | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID16(-1) + XWT-ID16(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | DRT2-ID32ML(-1) |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | DRT2-ID32B(-1) |
| | | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | DRT2-ID32BV(-1) |
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-ID32SL(-1) |
| | | | | | | | | | | DRT2-ID32SLH(-1) |

**Note** The shaded parts indicate status bits.

## General-purpose Slaves (Output)

| Instance number | Type | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Assembly instance 33 | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-OD04CL(-1) |
| Assembly instance 34<br>8 outputs | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-OD08(-1) |
| | | | | | | | | | | DRT2-MD16(-1) |
| | | | | | | | | | | DRT2-ID16(-1) + XWT-OD08(-1) |
| | | | | | | | | | | DRT2-OD08C(-1) |
| | | | | | | | | | | DRT2-OD08CL(-1) |
| | | | | | | | | | | DRT2-MD16CL(-1) |
| | | | | | | | | | | DRT2-MD16TA(-1) |
| | | | | | | | | | | DRT2-MD16S(-1) |

| Instance number | Type | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Assembly instance 35<br>16 outputs | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-OD16(-1)<br>DRT2-ID16(-1) + XWT-OD16(-1)<br>DRT2-OD16(-1) + XWT-ID08(-1)<br>DRT2-OD16(-1) + XWT-ID16(-1)<br>DRT2-ROS16<br>DRT2-WD16CL(-1)<br>DRT2-OD16TA(-1)<br>DRT2-OD16ML(X)(-1)<br>DRT2-OD16SL(-1)<br>DRT2-OD16SLH(-1)<br>DRT2-MD32ML(-1)<br>DRT2-MD32B(-1)<br>DRT2-MD32BV(-1)<br>DRT2-MD32SL(-1)<br>DRT2-MD32SLH(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| Assembly instance 36<br>32 outputs | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-OD16(-1) + XWT-OD16(-1)<br>DRT2-ROS16 + XWT-OD16(-1)<br>DRT2-OD32ML(-1)<br>DRT2-OD32B(-1)<br>DRT2-OD32BV(-1)<br>DRT2-OD32SL(-1)<br>DRT2-OD32SLH(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | |
| | | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | |
| Assembly instance 37<br>24 outputs | Output | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | DRT2-OD16(-1) + XWT-OD08(-1)<br>DRT2-ROS16 + XWT-OD08(-1) |
| | | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | |
| | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | |

## Analog Slaves (Input)

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 104<br>Analog Data 1 (input) | +0 | Input 0, Analog Data 1 | | | | | | | | DRT2-AD04<br>DRT2-AD04H |
| | +1 | | | | | | | | | |
| | +2 | Input 1, Analog Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Input 2, Analog Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Input 3, Analog Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| Instance 114<br>Analog Data 2 (input) | +0 | Input 0, Analog Data 2 | | | | | | | | DRT2-AD04<br>DRT2-AD04H |
| | +1 | | | | | | | | | |
| | +2 | Input 1, Analog Data 2 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Input 2, Analog Data 2 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Input 3, Analog Data 2 | | | | | | | | |
| | +7 | | | | | | | | | |
| Instance 121<br>Generic Status Flags | +0 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | DRT2-AD04<br>DRT2-DA02<br>DRT2-AD04H |

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 122 Top/Valley Detection Timing Flags | +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | DRT2-AD04 |
| | +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | DRT2-AD04H |
| Instance 134 Analog Status Flags | +0 | BW0 | T_ST0 | V_ST0 | HH0 | H0 | PS0 | L0 | LL0 | DRT2-AD04 |
| | +1 | BW1 | T_ST1 | V_ST1 | HH1 | H1 | PS1 | L1 | LL1 | DRT2-AD04H |
| | +2 | BW2 | T_ST2 | V_ST2 | HH2 | H2 | PS2 | L2 | LL2 | |
| | +3 | BW3 | T_ST3 | V_ST3 | HH3 | H3 | PS3 | L3 | LL3 | |
| Instance 144 Analog Data 1 + Analog Data 2 | +0 | Input 0, Analog Data 1 | | | | | | | | DRT2-AD04 |
| | +1 | | | | | | | | | DRT2-AD04H |
| | +2 | Input 1, Analog Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Input 2, Analog Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Input 3, Analog Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | Input 0, Analog Data 2 | | | | | | | | |
| | +9 | | | | | | | | | |
| | +10 | Input 1, Analog Data 2 | | | | | | | | |
| | +11 | | | | | | | | | |
| | +12 | Input 2, Analog Data 2 | | | | | | | | |
| | +13 | | | | | | | | | |
| | +14 | Input 3, Analog Data 2 | | | | | | | | |
| | +15 | | | | | | | | | |
| Instance 151 Top/Valley Detection Timing Flags + Generic Status Flags | +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | DRT2-AD04 |
| | +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| | +2 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |
| Instance 164 Analog Status Flags + Generic Status Flags | +0 | BW0 | T_ST0 | V_ST0 | HH0 | H0 | PS0 | L0 | LL0 | DRT2-AD04 |
| | +1 | BW1 | T_ST1 | V_ST1 | HH1 | H1 | PS1 | L1 | LL1 | DRT2-AD04H |
| | +2 | BW2 | T_ST2 | V_ST2 | HH2 | H2 | PS2 | L2 | LL2 | |
| | +3 | BW3 | T_ST3 | V_ST3 | HH3 | H3 | PS3 | L3 | LL3 | |
| | +4 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |
| Instance 174 Analog Data 1 + Top/Valley Detection Timing Flags | +0 | Input 0, Analog Data 1 | | | | | | | | DRT2-AD04 |
| | +1 | | | | | | | | | DRT2-AD04H |
| | +2 | Input 1, Analog Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Input 2, Analog Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Input 3, Analog Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 184 Analog Data 1 + Top/ Valley Detection Tim-ing Flags + Generic Status Flags | +0 | Input 0, Analog Data 1 | | | | | | | | DRT2-AD04 DRT2-AD04H |
| | +1 | | | | | | | | | |
| | +2 | Input 1, Analog Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Input 2, Analog Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Input 3, Analog Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| | +10 | 0 | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |

## Analog Slaves (Output)

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 190 Hold Flags | +0 | | | | | HD3 | HD1 | HD1 | HD0 | DRT2-AD04 DRT2-AD04H |
| Instance 192 Analog output data | +0 | Input 0, Analog Data | | | | | | | | DRT2-DA02 |
| | +1 | | | | | | | | | |
| | +2 | Input 1, Analog Data | | | | | | | | |
| | +3 | | | | | | | | | |

## Temperature Input Terminals (Inputs)

| Instance number | Byte | Bit allocation | Supported model |
|---|---|---|---|
| Instance 104 Temperature data 1, normal display | +0 | Ch0 Temperature Data 1 | DRT2-TS04T DRT2-TS04P |
| | +1 | | |
| | +2 | Ch1 Temperature Data 1 | |
| | +3 | | |
| | +4 | Ch2 Temperature Data 1 | |
| | +5 | | |
| | +6 | Ch3 Temperature Data 1 | |
| | +7 | | |
| Instance 108 Instance 104 Temperature data 1, 1/100 display | +0 | Ch0 Temperature Data 1 | DRT2-TS04T DRT2-TS04P |
| | +1 | | |
| | +2 | | |
| | +3 | | |
| | +4 | Ch1 Temperature Data 1 | |
| | +5 | | |
| | +6 | | |
| | +7 | | |
| | +8 | Ch2 Temperature Data 1 | |
| | +9 | | |
| | +10 | | |
| | +11 | | |
| | +12 | Ch3 Temperature Data 1 | |
| | +13 | | |
| | +14 | | |
| | +15 | | |

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 114<br>Instance 104<br>Temperature data 2, normal display | +0 | Ch0 Temperature Data 2 | | | | | | | | DRT2-TS04T<br>DRT2-TS04P |
| | +1 | | | | | | | | | |
| | +2 | Ch1 Temperature Data 2 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch2 Temperature Data 2 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Ch3 Temperature Data 2 | | | | | | | | |
| | +7 | | | | | | | | | |
| Instance 118<br>Instance 104<br>Temperature data 2, 1/100 display | +0 | Ch0 Temperature Data 2 | | | | | | | | DRT2-TS04T<br>DRT2-TS04P |
| | +1 | | | | | | | | | |
| | +2 | | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch1 Temperature Data 2 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | Ch2 Temperature Data 2 | | | | | | | | |
| | +9 | | | | | | | | | |
| | +10 | | | | | | | | | |
| | +11 | | | | | | | | | |
| | +12 | Ch3 Temperature Data 2 | | | | | | | | |
| | +13 | | | | | | | | | |
| | +14 | | | | | | | | | |
| | +15 | | | | | | | | | |
| Instance 121<br>Generic status flags | +0 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 | DRT2-TS04T<br>DRT2-TS04P |
| Instance 122<br>Top/valley detection timing flags | +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | DRT2-TS04T<br>DRT2-TS04P |
| | +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| Instance 134<br>Analog status flags | +0 | BW0 | T_ST0 | V_ST0 | HH0 | H0 | PS0 | L0 | LL0 | DRT2-AD04<br>DRT2-AD04H |
| | +1 | BW1 | T_ST1 | V_ST1 | HH1 | H1 | PS1 | L1 | LL1 | |
| | +2 | BW2 | T_ST2 | V_ST2 | HH2 | H2 | PS2 | L2 | LL2 | |
| | +3 | BW3 | T_ST3 | V_ST3 | HH3 | H3 | PS3 | L3 | LL3 | |

| Instance number | Byte | Bit allocation | Supported model |
|---|---|---|---|
| Instance 144 Temperature data 1 + Temperature data 2, normal display | +0 | Ch0 Temperature Data 1 | DRT2-TS04T DRT2-TS04P |
| | +1 | | |
| | +2 | Ch1 Temperature Data 1 | |
| | +3 | | |
| | +4 | Ch2 Temperature Data 1 | |
| | +5 | | |
| | +6 | Ch3 Temperature Data 1 | |
| | +7 | | |
| | +8 | Ch0 Temperature Data 2 | |
| | +9 | | |
| | +10 | Ch1 Temperature Data 2 | |
| | +11 | | |
| | +12 | Ch2 Temperature Data 2 | |
| | +13 | | |
| | +14 | Ch3 Temperature Data 2 | |
| | +15 | | |
| Instance 148 Temperature data 1 + Temperature data 2, 1/100 display | +0 | Ch0 Temperature Data 1 | DRT2-TS04T DRT2-TS04P |
| | +1 | | |
| | +2 | | |
| | +3 | | |
| | +4 | Ch1 Temperature Data 1 | |
| | +5 | | |
| | +6 | | |
| | +7 | | |
| | +8 | Ch2 Temperature Data 1 | |
| | +9 | | |
| | +10 | | |
| | +11 | | |
| | +12 | Ch3 Temperature Data 1 | |
| | +13 | | |
| | +14 | | |
| | +15 | | |
| | +16 | Ch0 Temperature Data 2 | |
| | +17 | | |
| | +18 | | |
| | +19 | | |
| | +20 | Ch1 Temperature Data 2 | |
| | +21 | | |
| | +22 | | |
| | +23 | | |
| | +24 | Ch2 Temperature Data 2 | |
| | +25 | | |
| | +26 | | |
| | +27 | | |
| | +28 | Ch3 Temperature Data 2 | |
| | +29 | | |
| | +30 | | |
| | +31 | | |

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 151 Top/valley detection timing flag + generic status flags | +0 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | DRT2-TS04T |
| | +1 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | DRT2-TS04P |
| | +2 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |
| Instance 164 Analog status flags + generic status flags | +0 | BW0 | T_ST0 | V_ST0 | HH0 | H0 | PS0 | L0 | LL0 | DRT2-AD04 |
| | +1 | BW1 | T_ST1 | V_ST1 | HH1 | H1 | PS1 | L1 | LL1 | DRT2-AD04H |
| | +2 | BW2 | T_ST2 | V_ST2 | HH2 | H2 | PS2 | L2 | LL2 | |
| | +3 | BW3 | T_ST3 | V_ST3 | HH3 | H3 | PS3 | L3 | LL3 | |
| | +4 | CCB | --- | MRF | CCW | RHW | NPW | 0 | 0 | |
| Instance 174 Temperature data 1, normal display + Top/valley detection timing flag | +0 | Ch0 Temperature Data 1 | | | | | | | | DRT2-TS04T |
| | +1 | | | | | | | | | DRT2-TS04P |
| | +2 | Ch1 Temperature Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch2 Temperature Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Ch3 Temperature Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| Instance 178 Temperature data 1, 1/100 display + Top/valley detection timing flag | +0 | Ch0 Temperature Data 1 | | | | | | | | DRT2-TS04T |
| | +1 | | | | | | | | | DRT2-TS04P |
| | +2 | | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch1 Temperature Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | Ch2 Temperature Data 1 | | | | | | | | |
| | +9 | | | | | | | | | |
| | +10 | | | | | | | | | |
| | +11 | | | | | | | | | |
| | +12 | Ch3 Temperature Data 1 | | | | | | | | |
| | +13 | | | | | | | | | |
| | +14 | | | | | | | | | |
| | +15 | | | | | | | | | |
| | +16 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +17 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| Instance 184 Temperature data 1, normal display + Top/valley detection timing flag + Generic status flags | +0 | Ch0 Temperature Data 1 | | | | | | | | DRT2-TS04T |
| | +1 | | | | | | | | | DRT2-TS04P |
| | +2 | Ch1 Temperature Data 1 | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch2 Temperature Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | Ch3 Temperature Data 1 | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +9 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| | +10 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 188 Temperature data 1, 1/100 display + Top/valley detection timing flag + Generic status flags | +0 | Ch0 Temperature Data 1 | | | | | | | | DRT2-TS04T<br>DRT2-TS04P |
| | +1 | | | | | | | | | |
| | +2 | | | | | | | | | |
| | +3 | | | | | | | | | |
| | +4 | Ch1 Temperature Data 1 | | | | | | | | |
| | +5 | | | | | | | | | |
| | +6 | | | | | | | | | |
| | +7 | | | | | | | | | |
| | +8 | Ch2 Temperature Data 1 | | | | | | | | |
| | +9 | | | | | | | | | |
| | +10 | | | | | | | | | |
| | +11 | | | | | | | | | |
| | +12 | Ch3 Temperature Data 1 | | | | | | | | |
| | +13 | | | | | | | | | |
| | +14 | | | | | | | | | |
| | +15 | | | | | | | | | |
| | +16 | 0 | 0 | 0 | 0 | V_ST3 | V_ST2 | V_ST1 | V_ST0 | |
| | +17 | 0 | 0 | 0 | 0 | T_ST3 | T_ST2 | T_ST1 | T_ST0 | |
| | +18 | CCB | 0 | MRF | CCW | RHW | NPW | 0 | 0 | |

## Temperature Input Terminals (Output)

| Instance number | Byte | Bit allocation | | | | | | | | Supported model |
|---|---|---|---|---|---|---|---|---|---|---|
| Instance 190<br>Hold flag | +0 | --- | --- | --- | --- | HD3 | HD1 | HD1 | HD0 | DRT2-TS04T<br>DRT2-TS04P |

# Connection Object (0x05)

| | | |
|---|---|---|
| **Object class** | **Attribute** | Not supported |
| | **Service** | Not supported |
| | **Maximum number of active connections** | 1 |

| Object instance 1 | Section | Information | | Maximum number of instances | | |
|---|---|---|---|---|---|---|
| | **Instance type** | Explicit Message | | 1 | | |
| | **Production trigger** | Cyclic | | | | |
| | **Transport type** | Server | | | | |
| | **Transport class** | 3 | | | | |
| | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
| | | 1 | State | Yes | No | --- |
| | | 2 | Instance type | Yes | No | 00 (hexadecimal) |
| | | 3 | Transport class trigger | Yes | No | 83 (hexadecimal) |
| | | 4 | Produced connection ID | Yes | No | --- |
| | | 5 | Consumed connection ID | Yes | No | --- |
| | | 6 | Initial comm. characteristics | Yes | No | 21 (hexadecimal) |
| | | 7 | Produced connection size | Yes | No | 0026 (hexadecimal) |
| | | 8 | Consumed connection size | Yes | No | 0026 (hexadecimal) |
| | | 9 | Expected packet rate | Yes | Yes | --- |
| | | 12 | Watchdog timeout action | Yes | Yes | 01 or 03 (hexadecimal) |
| | | 13 | Produced connection path length | Yes | No | 0000 (hexadecimal) |
| | | 14 | Produced connection path | Yes | No | --- |
| | | 15 | Consumed connection path length | Yes | No | 0000 (hexadecimal) |
| | | 16 | Consumed connection path | Yes | No | --- |
| | | 17 | Production inhibit time | Yes | No | 0000 (hexadecimal) |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 05 | Reset | None | | |
| | | 0E | Get_Attribute_Single | None | | |
| | | 10 | Set_Attribute_Single | None | | |

| Object instance 2 | Section | Information | | Maximum number of instances | | |
|---|---|---|---|---|---|---|
| | **Instance type** | Polled I/O | | 1 | | |
| | **Production trigger** | Cyclic | | | | |
| | **Transport type** | Server | | | | |
| | **Transport class** | 2 | | | | |
| | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
| | | 1 | State | Yes | No | --- |
| | | 2 | Instance type | Yes | No | 01 (hexadecimal) |
| | | 3 | Transport class trigger | Yes | No | 82 (hexadecimal) |
| | | 4 | Produced connection ID | Yes | No | --- |
| | | 5 | Consumed connection ID | Yes | No | --- |
| | | 6 | Initial comm. characteristics | Yes | No | 01 (hexadecimal) |
| | | 7 | Produced connection size | Yes | No | See note. |
| | | 8 | Consumed connection size | Yes | No | See note. |
| | | 9 | Expected packet rate | Yes | Yes | --- |
| | | 12 | Watchdog timeout action | Yes | No | 00 |
| | | 13 | Produced connection path length | Yes | No | See note. |
| | | 14 | Produced connection path | Yes | No | See note. |
| | | 15 | Consumed connection path length | Yes | No | See note. |
| | | 16 | Consumed connection path | Yes | No | See note. |
| | | 17 | Production inhibit time | Yes | No | 0000 (hexadecimal) |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 05 | Reset | None | | |
| | | 0E | Get_Attribute_Single | None | | |
| | | 10 | Set_Attribute_Single | None | | |

**Note** The produced connection size and consumed connection size depend on the type of Slave being used, as shown in the following table.

| Model: Basic Unit | Model: Expansion Unit | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| DRT2-ID08(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| DRT2-ID16(-1) | None | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID08(-1) | Input Data | 0003 (hexa-decimal) | 0006 | 20_04_24_07_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0004 (hexa-decimal) | 0006 | 20_04_24_67_30_03 | --- | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID16(-1) | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | --- | 0000 | --- |
| DRT2-ID16(-1) | XWT-OD08(-1) | Input Data | 02 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 01 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 03 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0001 (hexa-decimal) | 0006 | 20_04_24_22_30_03 |
| DRT2-ID16(-1) | XWT-OD16(-1) | Input Data | 02 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 01 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 03 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| DRT2-OD08(-1) | | Output Data | --- | 0000 | --- | 0002 | 0006 | 20_04_24_22_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | --- | --- |
| DRT2-OD16(-1) | None | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Generic Status | 01 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-OD16(-1) | XWT-ID08(-1) | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Input Data | 01 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 01 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 02 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| DRT2-OD16(-1) | XWT-ID16(-1) | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0003 (hexa-decimal) | 0006 | 20_04_24_25_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0004 (hexa-decimal) | 0006 | 20_04_24_24_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD16(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0006 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0006 | --- |
| | | Output Data | --- | 0000 | --- | 0001 | 0006 | 20_04_24_22_30_03 |
| DRT2-ROS16 | None | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | | 0000 | --- |
| DRT2-ROS16 | XWT-ID08(-1) | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-ROS16 | XWT-ID16(-1) | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ROS16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0003 (hexa-decimal) | 0006 | 20_04_24_25_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-ROS16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0004 (hexa-decimal) | 0006 | 20_04_24_24_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-ID16TA(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-OD16TA(-1) | | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD16TA(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0001 (hexa-decimal) | 0006 | 20_04_24_22_30_03 |
| DRT2-ID16S(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-MD16S(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0001 (hexa-decimal) | 0006 | 20_04_24_22_30_03 |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-ID16SL(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID16SLH(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID16ML(X)(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID32ML(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | --- | 0000 | --- |
| DRT2-OD16ML(X)(-1) | | Output Data | --- | 0000 | --- | --- | --- | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | --- | --- |
| DRT2-OD16SL(-1) | | Output Data | --- | 0000 | --- | --- | --- | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | --- | --- |
| DRT2-OD16SLH(-1) | | Output Data | --- | 0000 | --- | --- | --- | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | --- | --- |
| DRT2-OD32ML(-1) | | Output Data | --- | 0000 | --- | 0004 (hexa-decimal) | 0006 | 20_04_24_24_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD32ML(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-ID32B(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | --- | 0000 | --- |
| DRT2-OD32B(-1) | | Output Data | --- | 0000 | --- | 0004 | 0006 | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD32B(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 | 0006 | 20_04_24_23_30_03 |
| DRT2-ID32BV(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-OD32BV(-1) | | Output Data | --- | 0000 | --- | 0004 | 0006 | 20_04_24_30_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD32BV(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 | 0006 | 20_04_24_23_30_03 |
| DRT2-ID32SL(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | --- | 0000 | --- |
| DRT2-OD32SL(-1) | | Output Data | --- | 0000 | --- | 0004 (hexa-decimal) | 0006 | 20_04_24_24_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-MD32SL(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| DRT2-ID32SLH(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | --- | 0000 | --- |
| DRT2-OD32SLH(-1) | | Output Data | --- | 0000 | --- | 0004 (hexa-decimal) | 0006 | 20_04_24_24_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD32SLH(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0002 (hexa-decimal) | 0006 | 20_04_24_23_30_03 |
| DRT2-HD16C(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID08C(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| DRT2-OD08C(-1) | | Output Data | --- | 0000 | --- | 0001 (hexa-decimal) | 0006 | 20_04_24_22_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-ID04C(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_03_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-HD16CL(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | --- | 0000 | --- |
| DRT2-ID08CL(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| DRT2-OD04CL(-1) | | Output Data | --- | 0000 | --- | --- | 0000 | 20_04_24_21_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-OD08CL(-1) | | Output Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-WD16CL(-1) | | Output Data | --- | 0000 | --- | 0002 | 0006 | 20_04_24_23_30_03 |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| DRT2-MD16CL(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | --- | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | --- | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0001 | 0006 | 20_04_24_22_30_03 |
| DRT2-AD04<br>DRT2-AD04H | | Analog Data 1 | 0008 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | 0000 (hexa-decimal) | 0000 | --- |
| | | Analog Data 2 | 0008 (hexa-decimal) | 0006 | 20_04_24_72_30_03 | 0000 (hexa-decimal) | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_79_30_03 | 0000 (hexa-decimal) | 0000 | --- |
| | | Top and Valley shot | 0002 (hexa-decimal) | 0006 | 20_04_24_7A_30_03 | 0000 (hexa-decimal) | 0000 | --- |
| | | Analog Status | 0004 (hexa-decimal) | 0006 | 20_04_24_86_30_03 | 0000 (hexa-decimal) | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-AD04<br>DRT2-AD04H | | Analog data 1 + Analog data 2 | 0010 (hexa-decimal) | 0006 | 20_04_24_ 90_30_03 | 0000 (hexa-decimal) | 0000 | --- |
| | | Top and Valley shot + Generic status | 0003 (hexa-decimal) | 0006 | 20_04_24_ 97_30_03 | 0 | 0000 | --- |
| | | Analog Status + Generic status | 0005 (hexa-decimal) | 0006 | 20_04_24_ A4_30_03 | 0 | 0000 | --- |
| | | Analog data 1 + Top and valley shot | 000A (hexadecimal) | 0006 | 20_04_24_ AE_30_03 | 0 | 0000 | --- |
| | | Analog data 1 + Top and valley shot + generic status | 000B (hexadecimal) | 0006 | 20_04_24_ B8_30_03 | 0 | 0000 | --- |
| | | Hold control | 0000 (hexa-decimal) | 0000 | --- | 1 | 0006 | 20_04_24_ BE_30_03 |
| DRT2-DA02 | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_ 79_30_03 | --- | --- | --- |
| | | Analog Data | --- | 0006 | --- | 4 | 0006 | 20_04_24_ C0_30_03 |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-TS04T<br>DRT2-TS04P | | Temperature Data 1 (Normal) | 0008 | 0006 | 20_04_24_68_30_03 | 0000 | 0000 | --- |
| | | Temperature Data 1 (1/100 display) | 0010 | 0006 | 20_04_24_6C_30_03 | 0000 | 0000 | --- |
| | | Temperature Data 2 (Normal) | 0008 | 0006 | 20_04_24_72_30_03 | 0000 | 0000 | --- |
| | | Temperature Data 2 (1/100 display) | 0010 | 0006 | 20_04_24_76_30_03 | 0000 | 0000 | --- |
| | | Generic Status | 0001 | 0006 | 20_04_24_79_30_03 | 0000 | 0000 | --- |
| | | Top and Valley shot | 0002 | 0006 | 20_04_24_7A_30_03 | 0000 | 0000 | --- |
| | | Analog Status | 0004 | 0006 | 20_04_24_86_30_03 | 0000 | 0000 | --- |
| | | Temperature data 1 + Temperature data 2 (Normal) | 0010 | 0006 | 20_04_24_90_30_03 | 0000 | 0000 | --- |
| | | Temperature data 1 + Temperature data 2 (1/100 display) | 0020 | 0006 | 20_04_24_94_30_03 | 0000 | 0000 | --- |
| | | Top and Valley shot + Generic Status | 0003 | 0006 | 20_04_24_97_30_03 | 0000 | 0000 | --- |
| | | Analog Status + Generic Status | 0005 | 0006 | 20_04_24_A4_30_03 | 0000 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection size | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | | |
| DRT2-TS04T<br>DRT2-TS04P | | Temperature data 1 (Normal) + Top and Valley shot | 000A | 0006 | 20_04_24_AE_30_03 | 0000 | 0000 | --- |
| | | Temperature data 1 (1/100 display) + Top and Valley shot | 0012 | 0006 | 20_04_24_B2_30_03 | 0000 | 0000 | --- |
| | | Temperature data 1 (Normal) + Top and Valley shot + Generic Status | 000B | 0006 | 20_04_24_B8_30_03 | 0000 | 0000 | --- |
| | | Temperature data 1 (1/100 display) + Top and Valley shot + Generic Status | 0013 | 0006 | 20_04_24_BC_30_03 | 0000 | 0000 | --- |
| | | Hold control | 0000 | 0000 | --- | 0001 | 0006 | 20_04_24_BE_30_03 |

| **Object instance 3** | **Section** | **Information** | | **Maximum number of instances** | | |
|---|---|---|---|---|---|---|
| | **Instance type** | Explicit Message | | 1 | | |
| | **Production trigger** | Cyclic | | | | |
| | **Transport type** | Server | | | | |
| | **Transport class** | 2 | | | | |
| | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
| | | 1 | State | Yes | No | --- |
| | | 2 | Instance type | Yes | No | 01 (hexadecimal) |
| | | 3 | Transport class trigger | Yes | No | 82 (hexadecimal) |
| | | 4 | Produced connection ID | Yes | No | --- |
| | | 5 | Consumed connection ID | Yes | No | --- |
| | | 6 | Initial comm. characteristics | Yes | No | 02 (hexadecimal) |
| | | 7 | Produced connection size | Yes | No | See note. |
| | | 8 | Consumed connection size | Yes | No | 0800 (hexadecimal) |
| | | 9 | Expected packet rate | Yes | Yes | --- |
| | | 12 | Watchdog timeout action | Yes | No | 00 (hexadecimal) |
| | | 13 | Produced connection path length | Yes | No | See note. |
| | | 14 | Produced connection path | Yes | No | See note. |
| | | 15 | Consumed connection path length | Yes | No | 0000 |
| | | 16 | Consumed connection path | Yes | No | See note. |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 05 | Reset | None | | |
| | | 0E | Get_Attribute_Single | None | | |
| | | 10 | Set_Attribute_Single | None | | |

**Note** The produced connection path and its length and the consumed connection path and its length depend on the type of Slave being used, as shown in the following table.

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ID08(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-ID16(-1) | None | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID08(-1) | Input Data | 0003 (hexa-decimal) | 0006 | 20_04_24_07_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0004 (hexa-decimal) | 0006 | 20_04_24_67_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID16(-1) | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-OD08(-1) | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0006 | --- |
| DRT2-ID16(-1) | XWT-OD16(-1) | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0006 | --- |
| DRT2-OD08(-1) | | Output Data | --- | 0000 | 20_04_24_22_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD16(-1) | None | Output Data | --- | 0000 | --- | 0006 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |

| Model: Basic Unit | Model: Expansion Unit | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| DRT2-OD16(-1) | XWT-ID08(-1) | Output Data | --- | 0000 | --- | 0006 | --- |
| | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04 _30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65 _30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-ID16(-1) | Output Data | --- | 0000 | | 0006 | --- |
| | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0006 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0006 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD16(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_04 _30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_65 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ROS16 | None | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-ROS16 | XWT-ID08(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04 _30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65 _30_03 | 0000 | --- |
| DRT2-ROS16 | XWT-ID16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| DRT2-ROS16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |

| Model: Basic Unit | Model: Expansion Unit | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| DRT2-ROS16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-ID16TA(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-OD16TA(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD16TA(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID16S(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-MD16S(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID16ML(X)(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID16SL (-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ID16SLH (-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| DRT2-ID32ML(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0005 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| DRT2-OD16SL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-OD16SLH(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-OD16ML(x)(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-OD32ML(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD32ML(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32B(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0005 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| DRT2-OD32B(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD32B(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | |
| DRT2-ID32BV(-1) | | Input Data | 0004 (hexadecimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexadecimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-OD32BV(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD32BV(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32SL(-1) | | Input Data | 0004 (hexadecimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexadecimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-OD32SL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD32SL(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32SLH(-1) | | Input Data | 0004 (hexadecimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexadecimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-OD32SLH(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD32SLH(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | |
| DRT2-HD16C(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID08C(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-OD08C(-1) | | Output Data | --- | 0000 | --- | 0006 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-ID04CL(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_03_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-HD16CL(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID08CL(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-WD16CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD04CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD08CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | |
| DRT2-MD16CL(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-AD04<br>DRT2-AD04 | | Analog Data 1 | 0008 (hexadecimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| | | Analog Data 2 | 0008 (hexadecimal) | 0006 | 20_04_24_72_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_79_30_03 | 0000 | --- |
| | | Top and Valley shot | 0002 (hexadecimal) | 0006 | 20_04_24_7A_30_03 | 0000 | --- |
| | | Analog Status | 0004 (hexadecimal) | 0006 | 20_04_24_86_30_03 | 0000 | --- |
| | | Top and Valley shot + Generic status | 0003 (hexadecimal) | 0006 | 20_04_24_97_30_03 | 0000 | --- |
| | | Analog Status + Generic status | 0005 (hexadecimal) | 0006 | 20_04_24_A4_30_03 | 0000 | --- |
| DRT2-DA02 | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_79_30_03 | 0000 | --- |
| DRT2-TS04T<br>DRT2-TS04P | | Temperature Data 1 (Normal) | 0008 | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| | | Temperature Data 2 (Normal) | 0008 | 0006 | 20_04_24_72_30_03 | 0000 | --- |
| | | Generic Status | 0001 | 0006 | 20_04_24_79_30_03 | 0000 | --- |
| | | Top and Valley shot | 0002 | 0006 | 20_04_24_7A_30_03 | 0000 | --- |
| | | Analog Status | 0004 | 0006 | 20_04_24_86_30_03 | 0000 | --- |
| | | Top and Valley shot + Generic Status | 0003 | 0006 | 20_04_24_97_30_03 | 0000 | --- |
| | | Analog Status + Generic Status | 0005 | 0006 | 20_04_24_A4_30_03 | 0000H | --- |

| Object instance 4 | Section | Information | | Maximum number of instances | | |
|---|---|---|---|---|---|---|
| | **Instance type** | COS Cyclic | | 1 | | |
| | **Production trigger** | Cyclic | | | | |
| | **Transport type** | Server | | | | |
| | **Transport class** | 2 | | | | |
| | **Attribute** | **ID** | **Contents** | **Get (read)** | **Set (write)** | **Value** |
| | | 1 | State | Yes | No | --- |
| | | 2 | Instance type | Yes | No | 01 (hexadecimal) |
| | | 3 | Transport class trigger | Yes | No | 12 |
| | | 4 | Produced connection ID | Yes | No | --- |
| | | 5 | Consumed connection ID | Yes | No | --- |
| | | 6 | Initial comm. characteristics | Yes | No | 01 (hexadecimal) |
| | | 7 | Produced connection size | Yes | No | See note. |
| | | 8 | Consumed connection size | Yes | No | 00 (hexadecimal) |
| | | 9 | Expected packet rate | Yes | Yes | 00 |
| | | 12 | Watchdog time-out action | Yes | No | 00 |
| | | 13 | Produced connection path length | Yes | No | See note. |
| | | 14 | Produced connection path | Yes | No | See note. |
| | | 15 | Consumed connection path length | Yes | No | 0004 (hexadecimal) |
| | | 16 | Consumed connection path | Yes | No | 202B2401 |
| | | 17 | Production inhibit time | Yes | No | 0000 (hexadecimal) |
| | **Service** | **DeviceNet service** | | **Parameter option** | | |
| | | 05 | Reset | None | | |
| | | 0E | Get_Attribute_Single | None | | |
| | | 10 | Set_Attribute_Single | None | | |

**Note** The produced connection path and its length and the consumed connection path and its length depend on the type of Slave being used, as shown in the following table.

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ID08(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-ID16(-1) | None | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID08(-1) | Input Data | 0003 (hexa-decimal) | 0006 | 20_04_24_07_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0004 (hexa-decimal) | 0006 | 20_04_24_67_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-ID16(-1) | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-ID16(-1) | XWT-OD08(-1) | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID16(-1) | XWT-OD16(-1) | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-OD08(-1) | | Output Data | --- | 0000 | 20_04_24_22_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD16(-1) | None | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-OD16(-1) | XWT-ID08(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-ID16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD16(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ROS16 | None | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-ROS16 | XWT-ID08(-1) | Output Data | --- | 0000 | - | 0000 | --- |
| | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-ROS16 | XWT-ID16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ROS16(-1) | XWT-OD08(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ROS16(-1) | XWT-OD16(-1) | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-ID16TA(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-OD16TA(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD16TA(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID16S(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-MD16S(-1) | | Input Data | 0001 (hexadecimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexadecimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID16ML(X)(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID16SL(-1) | | Input Data | 0002 (hexadecimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexadecimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexadecimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ID16SLH(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID32ML(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-OD16ML(X)(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD16SL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD16SLH(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD32ML(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD32ML(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32B(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0005 (hexa-decimal) | 0006 | 20_04_24_68_30_03 | 0000 | --- |
| DRT2-OD32B(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-MD32B(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-ID32BV(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0005 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| DRT2-OD32BV(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD32BV(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32SL(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0005 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| DRT2-OD32SL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD32ML(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-ID32SLH(-1) | | Input Data | 0004 (hexa-decimal) | 0006 | 20_04_24_06 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0005 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| DRT2-OD32SLH(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| DRT2-MD32MLH(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0003 (hexa-decimal) | 0006 | 20_04_24_66 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-HD16C(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID08C(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-OD08C(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-HD16CL(-1) | | Input Data | 0002 (hexa-decimal) | 0006 | 20_04_24_05_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0003 (hexa-decimal) | 0006 | 20_04_24_66_30_03 | 0000 | --- |
| DRT2-ID08CL(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-ID04CL(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_03_30_03 | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| | | Input Data + Generic Status | 0002 (hexa-decimal) | 0006 | 20_04_24_65_30_03 | 0000 | --- |
| DRT2-WD16CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD08CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |
| DRT2-OD04CL(-1) | | Output Data | --- | 0000 | --- | 0000 | --- |
| | | Generic Status | 0001 (hexa-decimal) | 0006 | 20_04_24_64_30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expan-sion Unit | | | | | | |
| DRT2-MD16CL(-1) | | Input Data | 0001 (hexa-decimal) | 0006 | 20_04_24_04 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_64 _30_03 | 0000 | --- |
| | | Input Data + Generic Sta-tus | 0002 (hexa-decimal) | 0006 | 20_04_24_65 _30_03 | 0000 | --- |
| | | Output Data | --- | 0000 | --- | 0000 | --- |
| DRT2-AD04 DRT2-AD04H | | Analog Data 1 | 0008 (hexa-decimal) | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| | | Analog Data 2 | 0008 (hexa-decimal) | 0006 | 20_04_24_72 _30_03 | 0000 | --- |
| | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_79 _30_03 | 0000 | --- |
| | | Top and Val-ley shot | 0002 (hexa-decimal) | 0006 | 20_04_24_7A _30_03 | 0000 | --- |
| | | Analog Status | 0004 (hexa-decimal) | 0006 | 20_04_24_86 _30_03 | 0000 | --- |
| | | Top and Val-ley shot + Generic status | 0003 (hexa-decimal) | 0006 | 20_04_24_97 _30_03 | 0000 | --- |
| | | Analog Sta-tus + Generic status | 0005 (hexa-decimal) | 0006 | 20_04_24_A4 _30_03 | 0000 | --- |
| DRT2-AD04 | | Analog data 1 + Analog data 2 | 0010 (hexa-decimal) | 0006 | 20_04_24_90 _30_03 | 0000 | --- |
| | | Analog data 1 + Top and val-ley shot | 000A (hexa-decimal) | 0006 | 20_04_24_AE _30_03 | 0000 | --- |
| | | Analog data 1 + Top and val-ley shot + generic status | 000B (hexa-decimal) | 0006 | 20_04_24_B8 _30_03 | 0000 | --- |
| DRT2-DA02 | | Generic Sta-tus | 0001 (hexa-decimal) | 0006 | 20_04_24_79 _30_03 | 0000 | --- |

| Model | | Name | Produced connection size | Produced connection path length | Produced connection path | Consumed connection path length | Consumed connection path |
|---|---|---|---|---|---|---|---|
| Basic Unit | Expansion Unit | | | | | | |
| DRT2-TS04T DRT2-TS04P | | Temperature Data 1 (Normal) | 0008 | 0006 | 20_04_24_68 _30_03 | 0000 | --- |
| | | Temperature Data 1 (1/100 display) | 0010 | 0006 | 20_04_24_6C _30_03 | 0000 | --- |
| | | Temperature Data 2 (Normal) | 0008 | 0006 | 20_04_24_72 _30_03 | 0000 | --- |
| | | Temperature Data 2 (1/100 display) | 0010 | 0006 | 20_04_24_76 _30_03 | 0000 | --- |
| | | Generic Status | 0001 | 0006 | 20_04_24_79 _30_03 | 0000 | --- |
| | | Top and Valley shot | 0002 | 0006 | 20_04_24_7A _30_03 | 0000 | --- |
| | | Analog Status | 0004 | 0006 | 20_04_24_86 _30_03 | 0000 | --- |
| | | Temperature Data 1 + Temperature Data 2 (Normal) | 0010 | 0006 | 20_04_24_90 _30_03 | 0000 | --- |
| | | Temperature Data 1 + Temperature Data 2 (1/100 display) | 0020 | 0006 | 20_04_24_94 _30_03 | 0000 | --- |
| | | Top and Valley shot + Generic Status | 0003 | 0006 | 20_04_24_97 _30_03 | 0000 | --- |
| | | Analog Status + Generic Status | 0005 | 0006 | 20_04_24_A4 _30_03 | 0000 | --- |
| | | Temperature Data 1 (Normal) + Top and Valley shot | 000A | 0006 | 20_04_24_AE _30_03 | 0000 | --- |
| | | Temperature Data 1 (1/100 display) + Top and Valley shot | 0012 | 0006 | 20_04_24_B2 _30_03 | 0000 | --- |
| | | Temperature Data 1 (Normal) + Top and Valley shot + Generic Status | 000B | 0006 | 20_04_24_B8 _30_03 | 0000 | --- |
| | | Temperature Data 1 (1/100 display) + Top and Valley shot + Generic Status | 0013 | 0006 | 20_04_24_BC _30_03 | 0000 | --- |

# Appendix C
## Restrictions on Reading
## Total ON Time/Contact Operation Counter
## for All Slaves at Once

## Restrictions

The Monitor Status for Total ON Time or Contact Operation Monitor for All Slaves Read at Once command is not supported by the following models with manufacturer revision 1.01.

If the command is executed for a model with manufacturer revision 1.01, the values in the response area data may not be correct.

### Applicable Models

| Slave name | Model |
|---|---|
| Remote I/O Terminal with 16 inputs | DRT2-ID16(-1) |
| Remote I/O Terminal with 16 outputs | DRT2-OD16(-1) |
| Environment-resistive Terminal with 8 inputs | DRT2-ID08C(-1) |
| Environment-resistive Terminal with 16 inputs | DRT2-HD16C(-1) |
| Environment-resistive Terminal with 8 outputs | DRT2-OD08C(-1) |
| Sensor Connector Terminal with 16 inputs | DRT2-ID16S(-1) |

**Note** 1. The (-1) suffix refers to models with PNP.

2. The read command cannot be used with DRT2-ID16(-1) and DRT2-OD16(-1), even if an Expansion Unit is mounted to the Remote I/O Terminal.
3. Models with manufacturer revision 1.02 or later (lot number 1263E or later) support the Monitor Status for Total ON Time or Contact Operation Monitor for All Slaves Read at Once command.
   Lot numbers:
   In the lot number 1263E, 12 = day, 6 = month, 3 = year, and E = factory where product was manufactured. Therefore, 1263E indicates a product manufactured on June 12, 2003.
4. DRT2 Slaves not mentioned in the above table support the Monitor Status for Total ON Time or Contact Operation Monitor for All Slaves Read at Once command, even if the Slaves are models with manufacturer revision 1.01.

### Checking the Manufacturer Revision Code

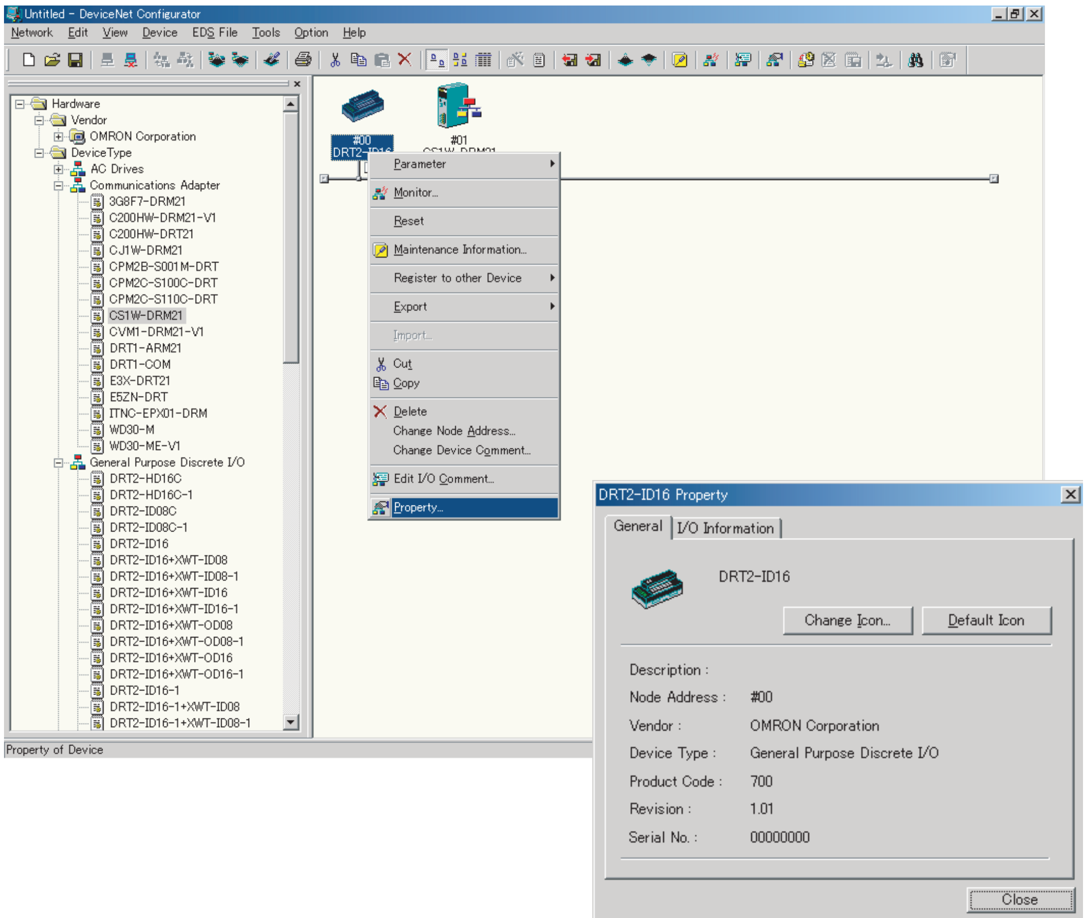
The manufacturer revision code can be checked by reading it using the EXPLICIT MESSAGE SEND command (2801) or from the Configurator.

#### EXPLICIT MESSAGE SEND Command (2801)

| Explicit message | Service | Function | Command | | | | | Response |
|---|---|---|---|---|---|---|---|---|
| | | | Service Code | Class ID | Instance ID | Attribute ID | Data size | |
| Identity revision | Read | Reads the identity revision | 0E | 01 | 01 | 04 | --- | 2 bytes<br>E.g.,<br>Response data:<br>0102: manufacturer revision 1.02 |

## Reading from the Configurator

Select the uploaded Unit using the Configurator, click the right mouse button over the Unit, and select ***Property***. The value displayed in the *Revision* field of the Property Window is the identity software version.




# Reading Monitor Status for Each Terminal

For models that do not support the Monitor Status for Total ON Time or Contact Operation Monitor for All Slaves Read at Once command, read the monitor status for Total ON Time or Contact Operation Monitor for each terminal separately.

## Reading Each Terminal

| | |
|---|---|
| Reading input terminals | Read using the Attribute ID 67 Hex, as described under *Setting and Monitoring the Terminal (Input)* on page 477. |
| Reading output terminals | Read using the Attribute ID 67 Hex, as described under *Setting and Monitoring the Terminal (Output)* on page 479. |

# Converting Data Read for Each Terminal into Data for All Slaves

The data read for each individual terminal can be processed automatically using a ladder program as a batch of data for all Slaves. Use the following method to read the data for all Slaves when using a product with manufacturer revision 1.01. The method shown here reads the data separately for each terminal and then converts the data into data read as a batch for all Slaves.

## Ladder Program System Configuration

PLC: Master
Node: Number 30
Slave: Node number 00

**Note** The ladder program reads data for one Slave at a time.

## Operation Specifications

The following table shows the applicable models (with manufacturer revision 1.01).

| Slave name | Model |
|---|---|
| Remote I/O Terminal with 16 inputs | DRT2-ID16(-1) |
| Remote I/O Terminal with 16 outputs | DRT2-OD16(-1) |
| Environment-resistive Terminal with 8 inputs | DRT2-ID08C(-1) |
| Environment-resistive Terminal with 16 inputs | DRT2-HD16C(-1) |
| Environment-resistive Terminal with 8 outputs | DRT2-OD08C(-1) |
| Sensor Connector Terminal with 16 inputs | DRT2-ID16S(-1) |

**Note**
1. The (-1) suffix refers to models with PNP.
2. The read command cannot be used with DRT2-ID16(-1) and DRT2-OD16(-1), even if an Expansion Unit is mounted to the Remote I/O Terminal.
3. DRT2 Slaves not mentioned in the above table support the Monitor Status for Total ON Time or Contact Operation Monitor for All Slaves Read at Once command, even if the Slaves are models with manufacturer revision 1.01. Therefore, the ladder program shown here is not required.

### Ladder Program Specifications

- When the start bit 0.00 turns ON, data starts being read for each individual terminal automatically, and the response is then transferred altogether as batch read data to DM 00050 to DM 00055.
- When one portion of the processing is completed, the end bit 0.02 turns ON.
- If the command needs to be executed again, after the end bit 0.02 turns ON, turn OFF 0.00 again, and then execute the program.

**Note**
1. The model is automatically recognized by the ladder program, so the ladder program does not need to be changed to suit each model.
2. In the following programming examples, the Master is node number 30 and the Slave is node number 00.
3. To change the node numbers, edit the program as follows:

#### Changing the Master's Node Number

Change the upper byte of the constant part of the MOV21 #1FFE DM 00003 command in the ladder program.

Example: Change to #3FFE for a Master with node number 63.

#### Changing the Slave's Node Number

Change the upper byte of the constant part of the MOV21 #000E DM 00011 command in the ladder program.

Example: Change to #0F0E for a Slave with node number 15.

### Response Area

Use words DM 00050 to DM 00055 to store the data. The internal processing areas are also reserved, so refer to the list of used areas.

## Response Storage Specifications

The format is the same as for standard explicit message responses

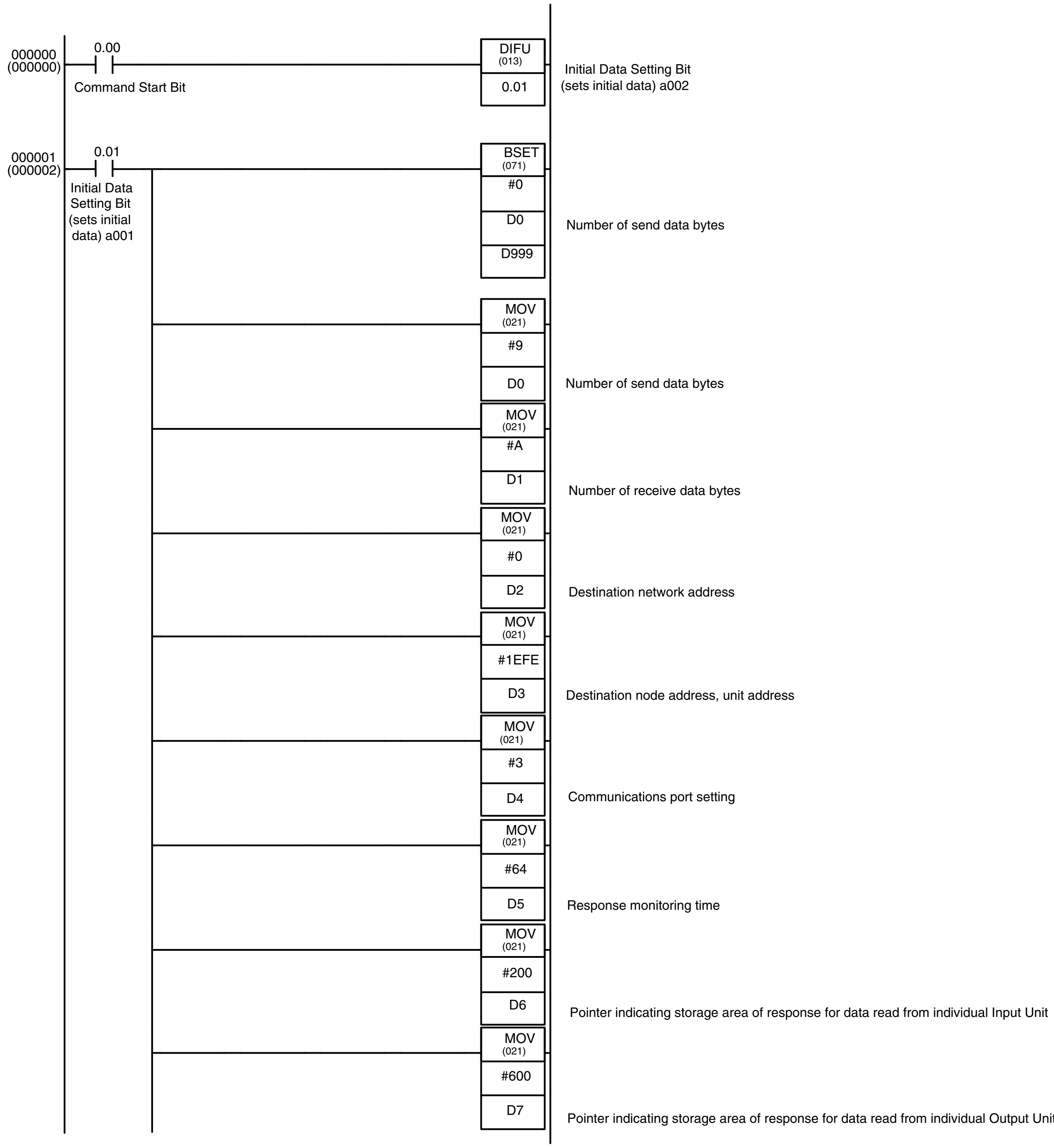
| Area | High side | Low side | Remarks |
|---|---|---|---|
| DM 0050 | End code | End code | 0000: Ended normally.<br>OCFF: Error occurred. |
| DM 0051 | 08 | 00 | 0800 fixed |
| DM 0052 | Monitors status of input No. 0 to No. 7. | Monitors status of input No. 8 to No. 15. | |
| DM 0053 | Monitors status of input No. 16 to No. 23. | Monitors status of input No. 31 to No. 24. | |
| DM 0054 | Monitors status of output No. 0 to No. 7. | Monitors status of output No. 8 to No. 15. | |
| DM 0055 | Monitors status of output No. 16 to No. 23. | Monitors status of output No. 31 to No. 24. | |

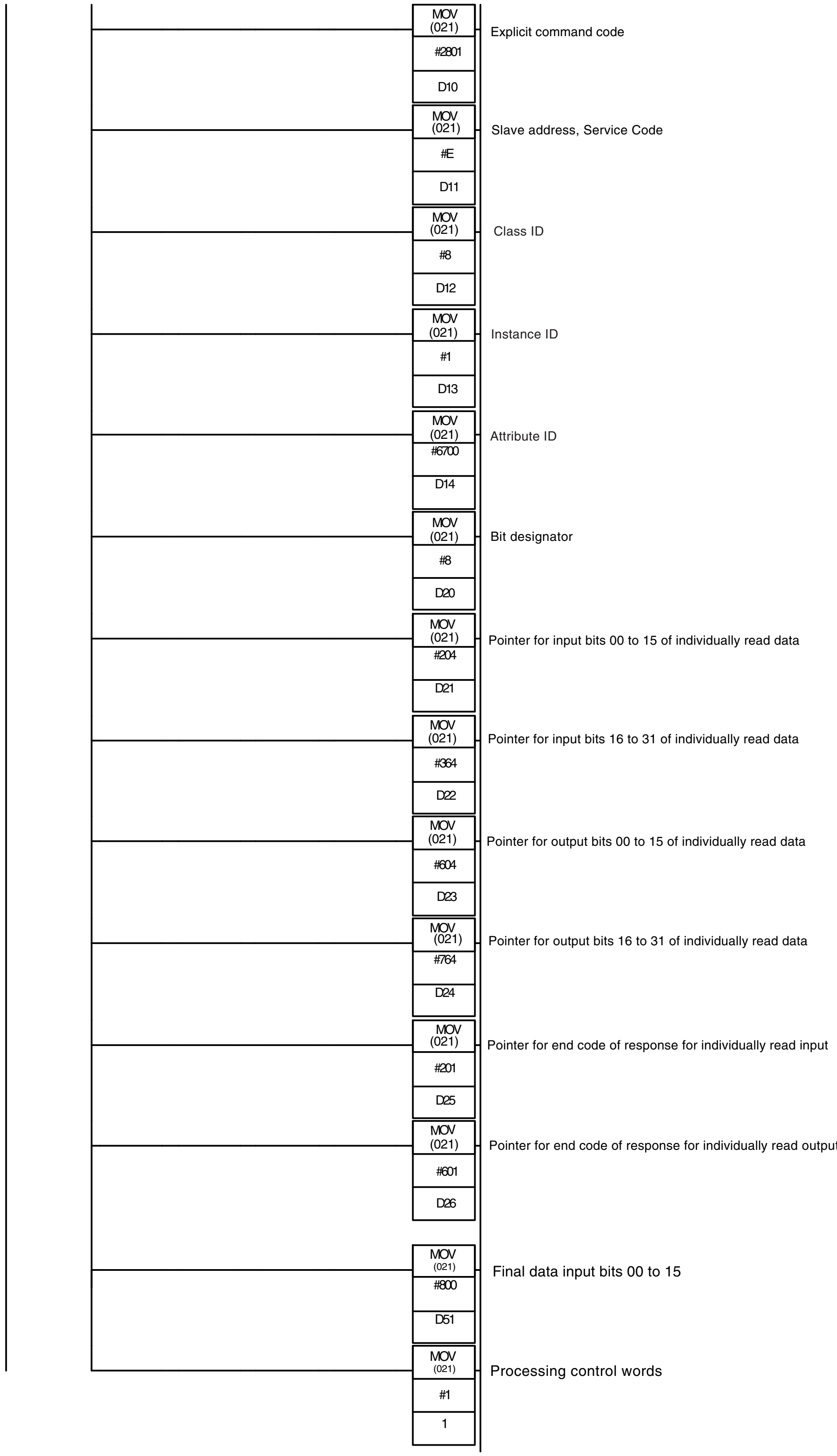
## List of Used Areas

| I/O Area | Words 0 and 1 |
|---|---|
| DM Area | DM 00000 to DM 00007,<br>DM 00010 to DM 00014,<br>DM 00020 to DM 00026,<br>DM 00050 to DM 00055<br>DM 00101 to DM 00104,<br>DM 00120 to DM 00123,<br>DM 00200 to DM 00204 + (10 x n)<br>n: Unit's number of input points<br>Example: If n = 32 points, the area is DM 00200 to DM 00524<br>DM 00600 to DM 00604 + (10 x m)<br>m: Unit's number of output points<br>Example: If m = 16, the area is DM 00600 to DM 00764 |
| Timer | 1, 2 |

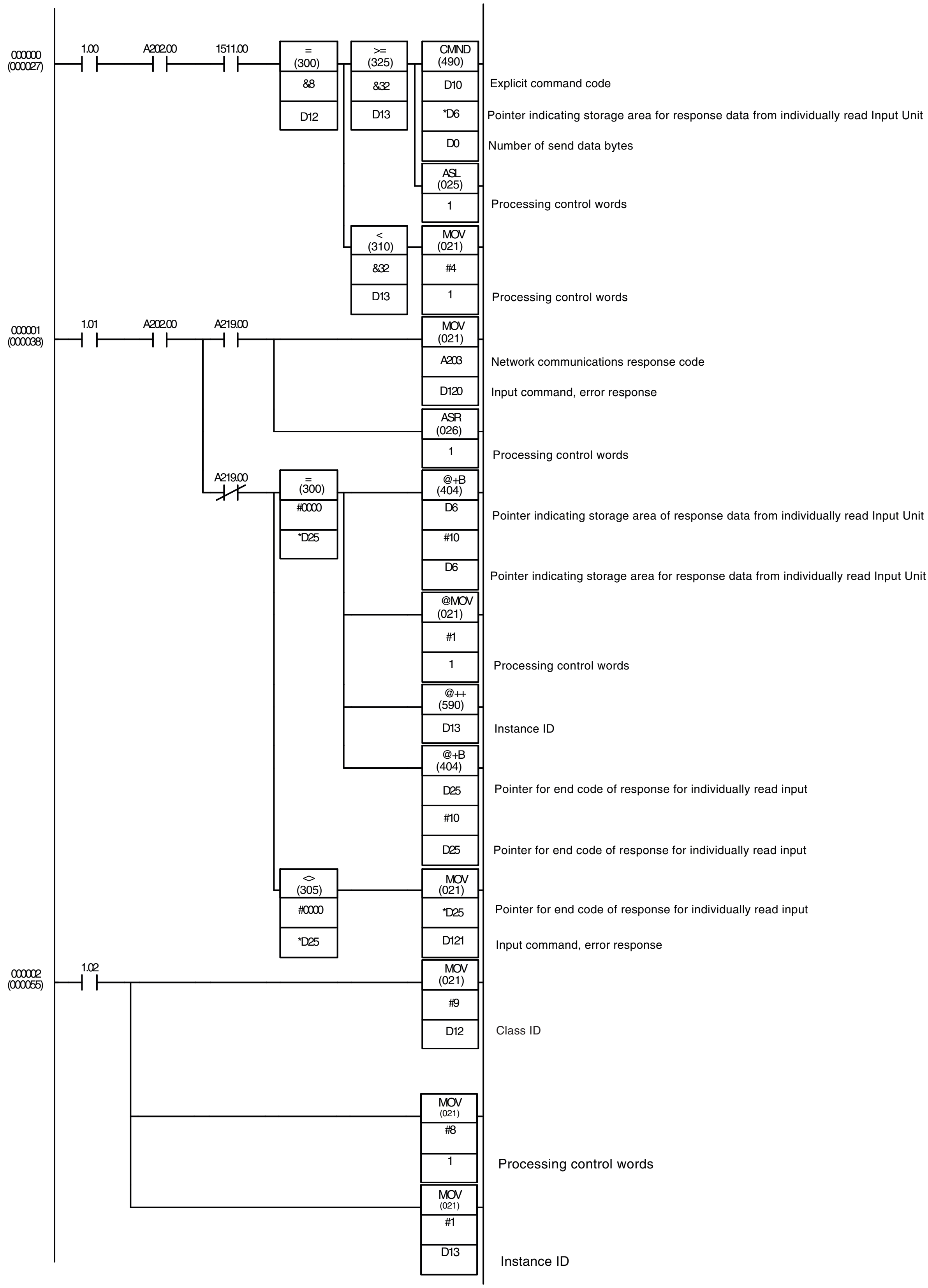
# Ladder Programming Sample

## Processing to Set the Initial Data

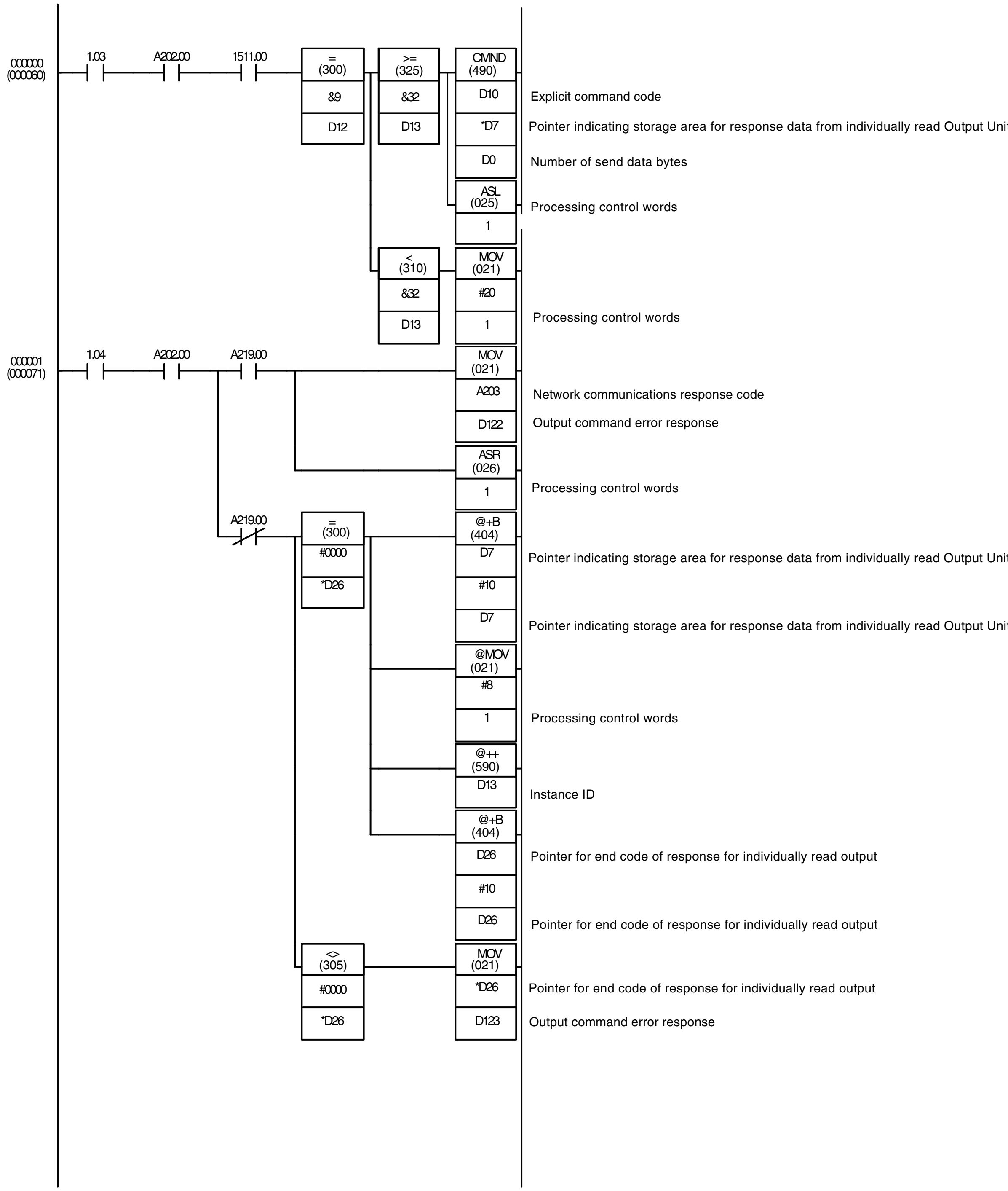



MOV (021) #2801 D10
Explicit command code
MOV (021) #E D11
Slave address, Service Code
MOV (021) #8 D12
Class ID
MOV (021) #1 D13
Instance ID
MOV (021) #6700 D14
Attribute ID
MOV (021) #8 D20
Bit designator
MOV (021) #204 D21
Pointer for input bits 00 to 15 of individually read data
MOV (021) #364 D22
Pointer for input bits 16 to 31 of individually read data
MOV (021) #604 D23
Pointer for output bits 00 to 15 of individually read data
MOV (021) #764 D24
Pointer for output bits 16 to 31 of individually read data
MOV (021) #201 D25
Pointer for end code of response for individually read input
MOV (021) #601 D26
Pointer for end code of response for individually read output
MOV (021) #800 D51
Final data input bits 00 to 15
MOV (021) #1 1
Processing control words

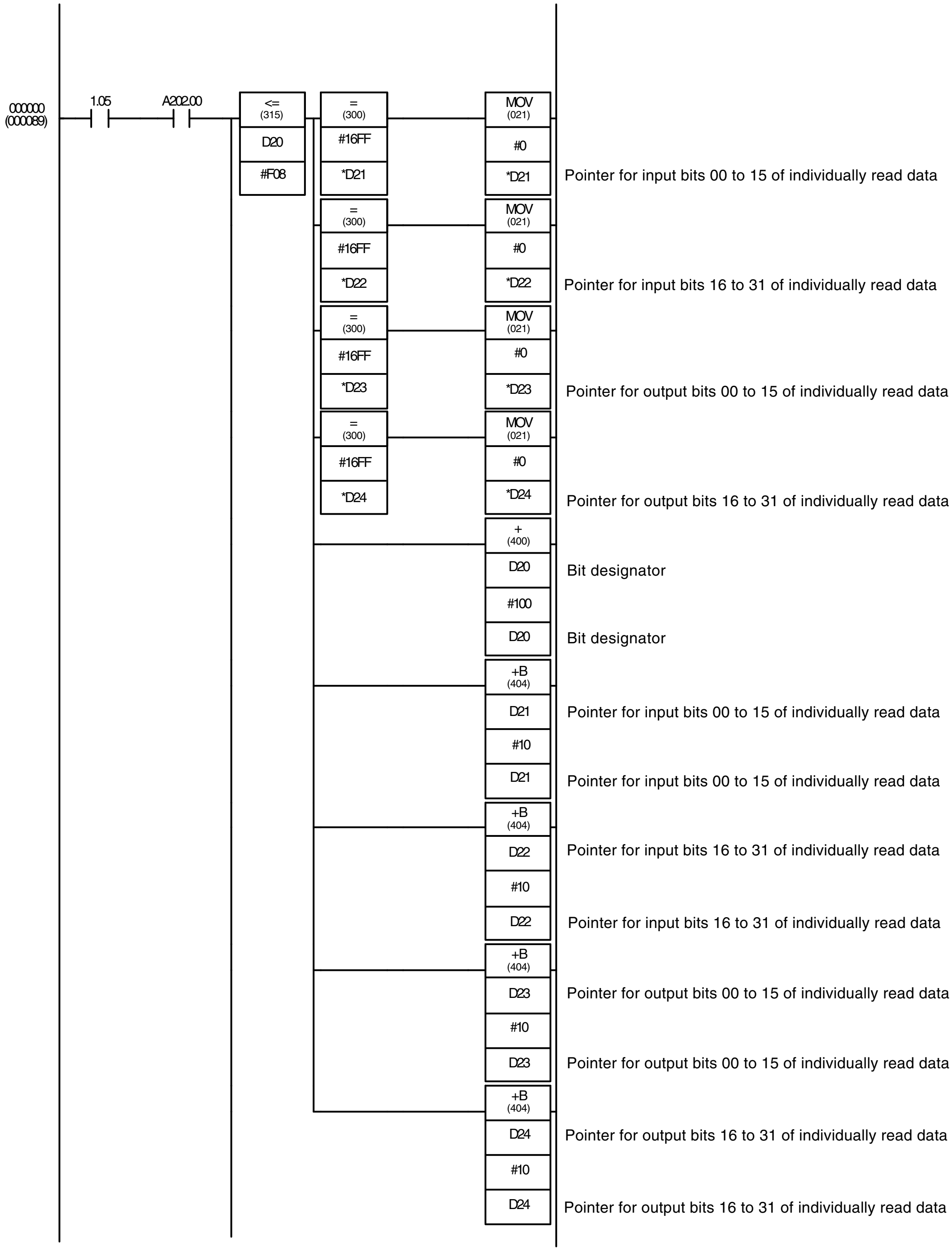
## Processing to Read Individual Input Units

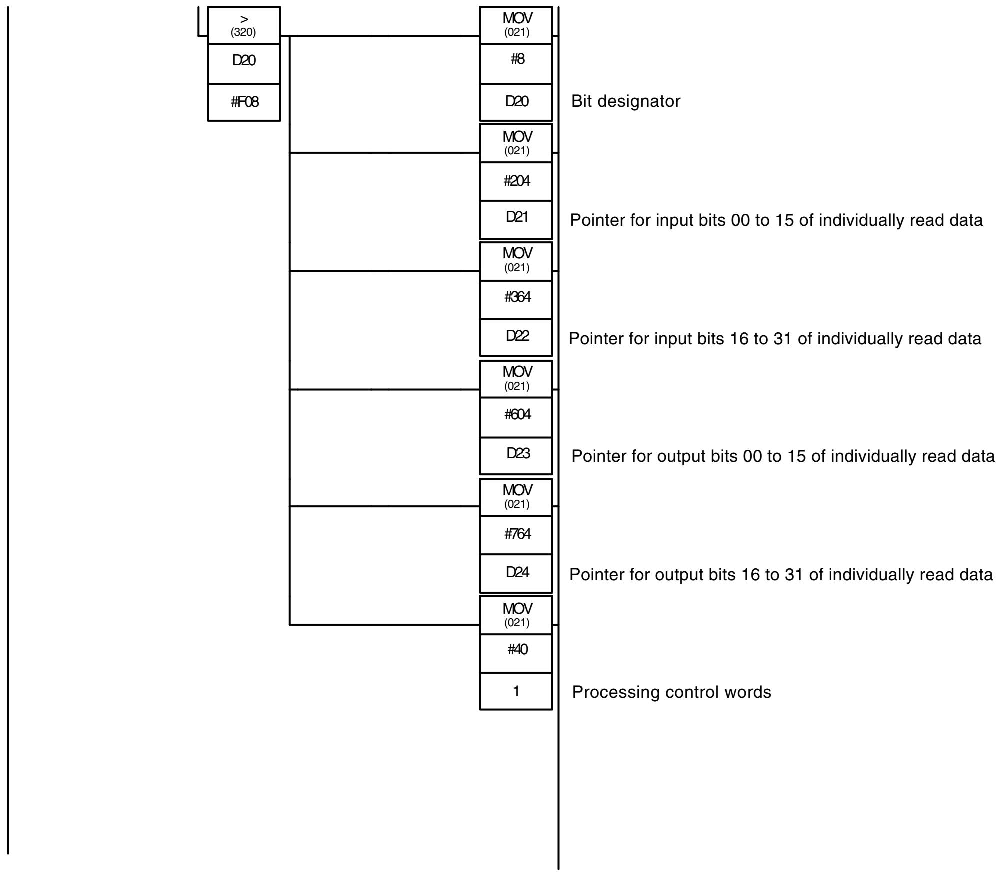


## Processing to Read Individual Output Units

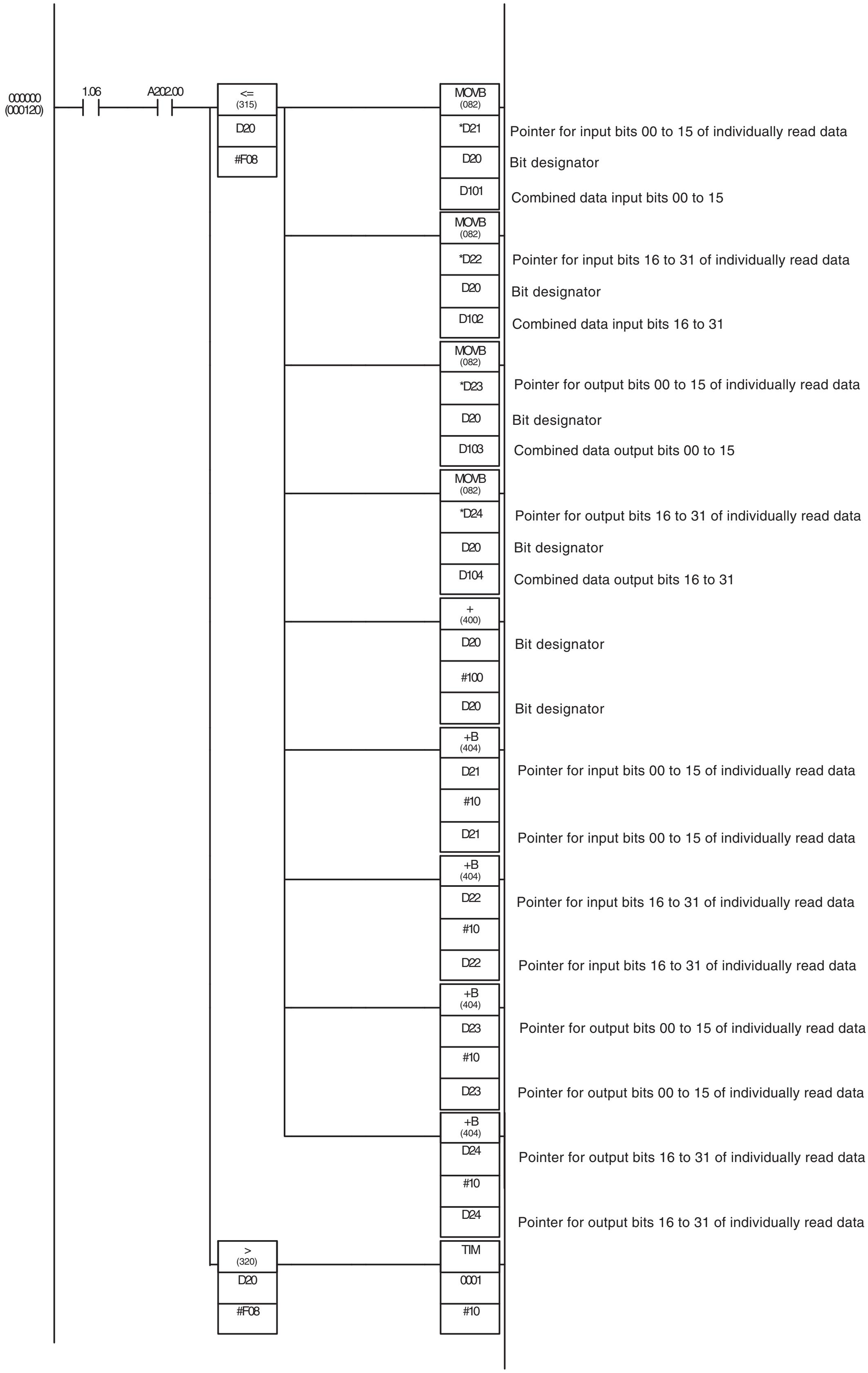


## Error Response Processing

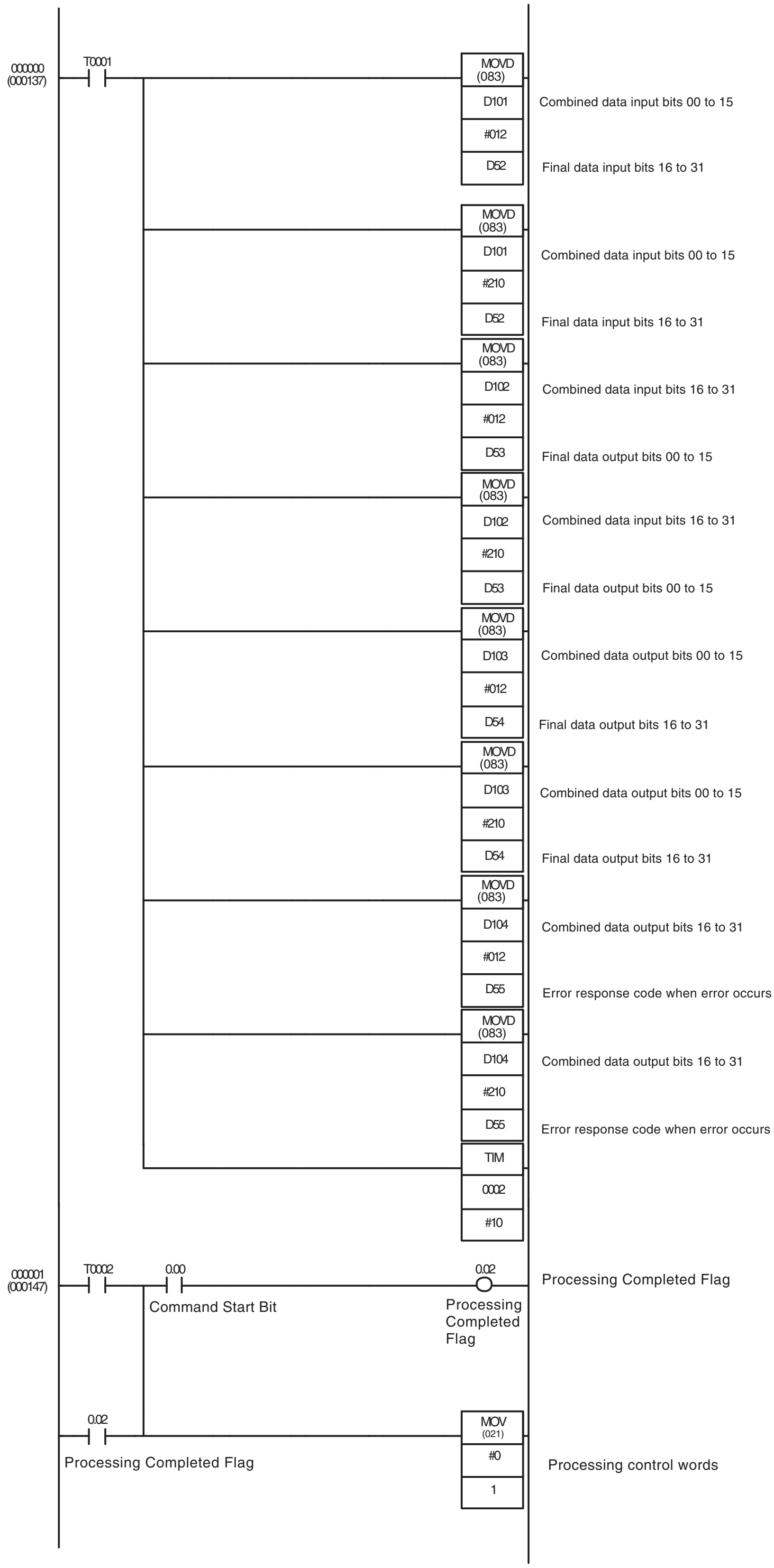



>
(320)
D20
#F08
MOV
(021)
#8
D20
Bit designator
MOV
(021)
#204
D21
Pointer for input bits 00 to 15 of individually read data
MOV
(021)
#364
D22
Pointer for input bits 16 to 31 of individually read data
MOV
(021)
#604
D23
Pointer for output bits 00 to 15 of individually read data
MOV
(021)
#764
D24
Pointer for output bits 16 to 31 of individually read data
MOV
(021)
#40
1
Processing control words

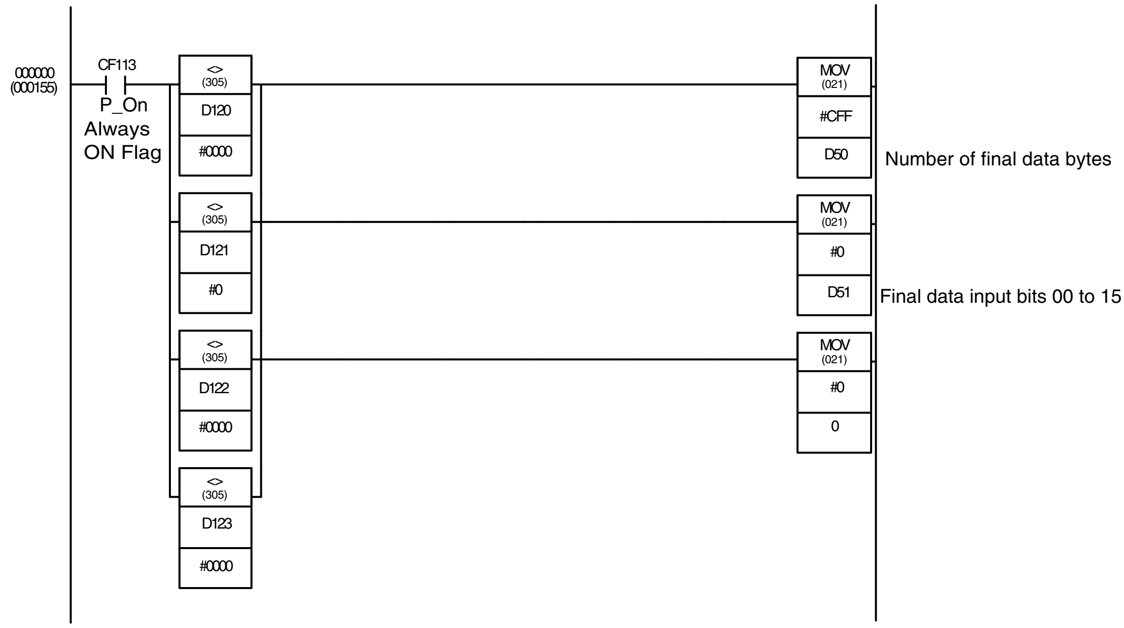
## Processing to Combine Data



## Processing to Create Final Data



## Error Response Storage Processing when Command Ends Abnormally




## END

# Appendix D
## Connectable Devices

## General-purpose Slaves

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-ID08 | Remote I/O Terminal with 8 transistor inputs (NPN) | OMRON |
| DRT2-ID08-1 | Remote I/O Terminal with 8 transistor inputs (PNP) | OMRON |
| DRT2-ID16 | Remote I/O Terminal with 16 transistor inputs (NPN) | OMRON |
| DRT2-ID16-1 | Remote I/O Terminal with 16 transistor inputs (PNP) | OMRON |
| DRT2-OD08 | Remote I/O Terminal with 8 transistor outputs (NPN) | OMRON |
| DRT2-OD08-1 | Remote I/O Terminal with 8 transistor outputs (PNP) | OMRON |
| DRT2-OD16 | Remote I/O Terminal with 16 transistor outputs (NPN) | OMRON |
| DRT2-OD16-1 | Remote I/O Terminal with 16 transistor outputs (PNP) | OMRON |
| DRT2-MD16 | Remote I/O Terminal with 8 transistor inputs and 8 transistor outputs (NPN) | OMRON |
| DRT2-MD16-1 | Remote I/O Terminal with 8 transistor inputs and 8 transistor outputs (PNP) | OMRON |
| DRT2-ROS16 | Remote I/O Terminal with 16 relay outputs | OMRON |
| XWT-ID16 | Remote I/O Terminal Expansion Unit with 16 transistor inputs (NPN) | OMRON |
| XWT-ID16-1 | Remote I/O Terminal Expansion Unit with 16 transistor inputs (PNP) | OMRON |
| XWT-OD16 | Remote I/O Terminal Expansion Unit with 16 transistor outputs (NPN) | OMRON |
| XWT-OD16-1 | Remote I/O Terminal Expansion Unit with 16 transistor outputs (PNP) | OMRON |
| XWT-ID08 | Remote I/O Terminal Expansion Unit with 8 transistor inputs (NPN) | OMRON |
| XWT-ID08-1 | Remote I/O Terminal Expansion Unit with 8 transistor inputs (PNP) | OMRON |
| XWT-OD08 | Remote I/O Terminal Expansion Unit with 8 transistor outputs (NPN) | OMRON |
| XWT-OD08-1 | Remote I/O Terminal Expansion Unit with 8 transistor outputs (PNP) | OMRON |
| DRT2-ID16TA | Remote I/O Terminal with 3-tier terminal blocks and 16 transistor inputs (NPN) | OMRON |
| DRT2-ID16TA-1 | Remote I/O Terminal with 3-tier terminal blocks and 16 transistor inputs (PNP) | OMRON |
| DRT2-OD16TA | Remote I/O Terminal with 3-tier terminal blocks and 16 transistor outputs (NPN) | OMRON |
| DRT2-OD16TA-1 | Remote I/O Terminal with 3-tier terminal blocks and 16 transistor outputs (PNP) | OMRON |
| DRT2-MD16TA | Remote I/O Terminal with 3-tier terminal blocks and 8 transistor inputs/8 transistor outputs (NPN) | OMRON |
| DRT2-MD16TA-1 | Remote I/O Terminal with 3-tier terminal blocks and 8 transistor inputs/8 transistor outputs (PNP) | OMRON |
| DRT2-ID16S | Sensor Connector Terminal with 16 transistor inputs (NPN) | OMRON |
| DRT2-ID16S-1 | Sensor Connector Terminal with 16 transistor inputs (PNP) | OMRON |
| DRT2-MD16S | Sensor Connector Terminal with 8 transistor inputs and 8 transistor outputs (NPN) | OMRON |
| DRT2-MD16S-1 | Sensor Connector Terminal with 8 transistor inputs and 8 transistor outputs (PNP) | OMRON |
| DRT2-ID16SL | Screw-less Clamp Remote I/O Terminal with 16 transistor inputs (NPN) and no detection functions | OMRON |
| DRT2-ID16SL-1 | Screw-less Clamp Remote I/O Terminal with 16 transistor inputs (PNP) and no detection functions | OMRON |
| DRT2-OD16SL | Screw-less Clamp Remote I/O Terminal with 16 transistor outputs (NPN) and no detection functions | OMRON |
| DRT2-OD16SL-1 | Screw-less Clamp Remote I/O Terminal with 16 transistor outputs (PNP) and no detection functions | OMRON |
| DRT2-ID16SLH | Screw-less Clamp Remote I/O Terminal with 16 transistor inputs (NPN) and detection functions | OMRON |
| DRT2-ID16SLH-1 | Screw-less Clamp Remote I/O Terminal with 16 transistor inputs (PNP) and detection functions | OMRON |

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-OD16SLH | Screw-less Clamp Remote I/O Terminal with 16 transistor outputs (NPN) and detection functions | OMRON |
| DRT2-OD16SLH-1 | Screw-less Clamp Remote I/O Terminal with 16 transistor outputs (PNP) and detection functions | OMRON |
| DRT2-ID16ML | MIL Connector Terminal with 16 transistor inputs (NPN) | OMRON |
| DRT2-ID16ML-1 | MIL Connector Terminal with 16 transistor inputs (PNP) | OMRON |
| DRT2-ID16MLX | MIL Connector Terminal with 16 transistor inputs (NPN)<br>(Includes cable with attached connector.) | OMRON |
| DRT2-ID16MLX-1 | MIL Connector Terminal with 16 transistor inputs (PNP)<br>(Includes cable with attached connector.) | OMRON |
| DRT2-ID32ML | MIL Connector Terminal with 32 transistor inputs (NPN) | OMRON |
| DRT2-ID32ML-1 | MIL Connector Terminal with 32 transistor inputs (PNP) | OMRON |
| DRT2-OD16ML | MIL Connector Terminal with 16 transistor outputs (NPN) | OMRON |
| DRT2-OD16ML-1 | MIL Connector Terminal with 16 transistor outputs (PNP) | OMRON |
| DRT2-OD16MLX | MIL Connector Terminal with 16 transistor outputs (NPN)<br>(Includes cable with attached connector.) | OMRON |
| DRT2-OD16MLX-1 | MIL Connector Terminal with 16 transistor outputs (PNP)<br>(Includes cable with attached connector.) | OMRON |
| DRT2-OD32ML | MIL Connector Terminal with 32 transistor outputs (NPN) | OMRON |
| DRT2-OD32ML-1 | MIL Connector Terminal with 32 transistor outputs (PNP) | OMRON |
| DRT2-MD32ML | MIL Connector Terminal with 16 transistor inputs/16 transistor outputs (NPN) | OMRON |
| DRT2-MD32ML-1 | MIL Connector Terminal with 16 transistor inputs/16 transistor outputs (PNP) | OMRON |
| DRT2-ID32B | Board MIL Connector Terminal with connector parallel to board and with 32 transistor inputs (NPN) | OMRON |
| DRT2-ID32B-1 | Board MIL Connector Terminal with connector parallel to board and with 32 transistor inputs (PNP) | OMRON |
| DRT2-OD32B | Board MIL Connector Terminal with connector parallel to board and with 32 transistor outputs (NPN) | OMRON |
| DRT2-OD32B-1 | Board MIL Connector Terminal with connector parallel to board and with 32 transistor outputs (PNP) | OMRON |
| DRT2-MD32B | Board MIL Connector Terminal with connector parallel to board and with16 transistor inputs/16 transistor outputs (NPN) | OMRON |
| DRT2-MD32B-1 | Board MIL Connector Terminal with connector parallel to board and with 16 transistor inputs/16 transistor outputs (PNP) | OMRON |
| DRT2-ID32BV | Board MIL Connector Terminal with connector perpendicular to board and with 32 transistor inputs (NPN) | OMRON |
| DRT2-ID32BV-1 | Board MIL Connector Terminal with connector perpendicular to board and with 32 transistor inputs (PNP) | OMRON |
| DRT2-OD32BV | Board MIL Connector Terminal with connector perpendicular to board and with 32 transistor outputs (NPN) | OMRON |
| DRT2-OD32BV-1 | Board MIL Connector Terminal with connector perpendicular to board and with 32 transistor outputs (PNP) | OMRON |
| DRT2-MD32BV | Board MIL Connector Terminal with connector perpendicular to board and with16 transistor inputs/16 transistor outputs (NPN) | OMRON |
| DRT2-MD32BV-1 | Board MIL Connector Terminal with connector perpendicular to board and with 16 transistor inputs/16 transistor outputs (PNP) | OMRON |
| DRT2-ID32SL | Screw-less Clamp Terminal with 32 transistor inputs and no detection functions (NPN) | OMRON |
| DRT2-ID32SL-1 | Screw-less Clamp Terminal with 32 transistor inputs and no detection functions (PNP) | OMRON |
| DRT2-OD32SL | Screw-less Clamp Terminal with 32 transistor outputs and no detection functions (NPN) | OMRON |
| DRT2-OD32SL-1 | Screw-less Clamp Terminal with 32 transistor outputs and no detection functions (PNP | OMRON |

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-MD32SL | Screw-less Clamp Terminal with 16 transistor inputs, 16 transistor outputs, and no detection functions (NPN) | OMRON |
| DRT2-MD32SL-1 | Screw-less Clamp Terminal with 16 transistor inputs, 16 transistor outputs, and no detection functions (PNP) | OMRON |
| DRT2-ID32SLH | Screw-less Clamp Terminal with 32 transistor inputs and detection functions (NPN) | OMRON |
| DRT2-ID32SLH-1 | Screw-less Clamp Terminal with 32 transistor inputs and detection functions (PNP) | OMRON |
| DRT2-OD32SLH | Screw-less Clamp Terminal with 32 transistor outputs and detection functions (NPN) | OMRON |
| DRT2-OD32SLH-1 | Screw-less Clamp Terminal with 32 transistor outputs and detection functions (PNP) | OMRON |
| DRT2-MD32SLH | Screw-less Clamp Terminal with 16 transistor inputs, 16 transistor outputs, and detection functions (NPN) | OMRON |
| DRT2-MD32SLH-1 | Screw-less Clamp Terminal with 16 transistor inputs, 16 transistor outputs, and detection functions (PNP) | OMRON |

## Environment-resistive Slaves

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-ID08C | Advanced Environment-resistive Terminal with 8 transistor inputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-ID08C-1 | Advanced Environment-resistive Terminal with 8 transistor inputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-HD16C | Advanced Environment-resistive Terminal with 16 transistor inputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-HD16C-1 | Advanced Environment-resistive Terminal with 16 transistor inputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD08C | Advanced Environment-resistive Terminal with 8 transistor outputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD08C-1 | Advanced Environment-resistive Terminal with 8 transistor outputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-ID04CL | Standard Environment-resistive Terminal with 4 transistor inputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-ID04CL-1 | Standard Environment-resistive Terminal with 4 transistor inputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-ID08CL | Standard Environment-resistive Terminal with 8 transistor inputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-ID08CL-1 | Standard Environment-resistive Terminal with 8 transistor inputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-HD16CL | Standard Environment-resistive Terminal with 16 transistor inputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-HD16CL-1 | Standard Environment-resistive Terminal with 16 transistor inputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD04CL | Standard Environment-resistive Terminal with 4 transistor outputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD04CL-1 | Standard Environment-resistive Terminal with 4 transistor outputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD08CL | Standard Environment-resistive Terminal with 8 transistor outputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-OD08CL-1 | Standard Environment-resistive Terminal with 8 transistor outputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-WD16CL | Standard Environment-resistive Terminal with 16 transistor outputs (NPN)<br>Conforms to IEC IP67 | OMRON |

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-WD16CL-1 | Standard Environment-resistive Terminal with 16 transistor outputs (PNP)<br>Conforms to IEC IP67 | OMRON |
| DRT2-MD16CL | Standard Environment-resistive Terminal with 16 transistor inputs /6 transistor outputs (NPN)<br>Conforms to IEC IP67 | OMRON |
| DRT2-MD16CL-1 | Standard Environment-resistive Terminal with 16 transistor inputs /6 transistor outputs (PNP)<br>Conforms to IEC IP67 | OMRON |

# Analog Slaves

| Model | Specifications | Manufacturer |
|---|---|---|
| DRT2-AD04 | Analog Input Terminal with 4 analog data inputs (4 words) | OMRON |
| DRT2-AD04H | High-resolution Analog Input Terminal with 4 analog data inputs (4 words) | OMRON |
| DRT2-DA02 | Analog Output Terminal with 2 analog data inputs (2 words) | OMRON |
| DRT2-TS04T | Thermocouple Temperature Input Terminal with 4 temperature data inputs | OMRON |
| DRT2-TS04P | Platinum-resistance Thermometer Temperature Input Terminal with 4 temperature data inputs | OMRON |

# Communications Cables

| Model | Specifications | Manufacturer |
|---|---|---|
| DCA2-5C10 | Thick Cable: 5 wires, 100 m | OMRON |
| DCA1-5C10 | Thin Cable: 5 wires, 100 m | OMRON |
| DVN18-10G | Thick Cable: 5 wires, 10 m | Nihon Wire & Cable (See note 1.) |
| DVN18-30G | Thick Cable: 5 wires, 30 m | Nihon Wire & Cable (See note 1.) |
| DVN18-50G | Thick Cable: 5 wires, 50 m | Nihon Wire & Cable (See note 1.) |
| DVN18-100G | Thick Cable: 5 wires, 100 m | Nihon Wire & Cable (See note 1.) |
| DVN18-300G | Thick Cable: 5 wires, 300 m | Nihon Wire & Cable (See note 1.) |
| DVN18-500G | Thick Cable: 5 wires, 500 m | Nihon Wire & Cable (See note 1.) |
| DVN24-10G | Thin Cable: 5 wires, 10 m | Nihon Wire & Cable (See note 1.) |
| DVN24-30G | Thin Cable: 5 wires, 30 m | Nihon Wire & Cable (See note 1.) |
| DVN24-50G | Thin Cable: 5 wires, 50 m | Nihon Wire & Cable (See note 1.) |
| DVN24-100G | Thin Cable: 5 wires, 100 m | Nihon Wire & Cable (See note 1.) |
| DVN24-300G | Thin Cable: 5 wires, 300 m | Nihon Wire & Cable (See note 1.) |
| DVN24-500G | Thin Cable: 5 wires, 500 m | Nihon Wire & Cable (See note 1.) |
| 1485C-P1-A50 | Thick Cable: 5 wires, 50 m | Allen-Bradley (See note 2.) |
| 1485C-P1-C150 | Thin Cable: 5 wires, 150 m | Allen-Bradley (See note 2.) |
| DCA1-5CN□□W1 | Cable with shielded micro-size (M12) connectors on both ends (female socket and male plug) | OMRON |

| Model | Specifications | Manufacturer |
|---|---|---|
| DCA1-5CN□□F1 | Cable with shielded micro-size (M12) connector (female socket) on one end | OMRON |
| DCA1-5CN□□H1 | Cable with shielded micro-size (M12) connector (male plug) on one end | OMRON |
| DCA1-5CN□□W5 | Cable with shielded connector on both ends (male plug on mini-size end, female socket on micro-size end) | OMRON |
| DCA2-5CN□□W1 | Cable with shielded mini-size connectors on both ends (female socket and male plug) | OMRON |
| DCA2-5CN□□F1 | Cable with shielded mini-size connector on one end (female socket) | OMRON |
| DCA1-5CN□□H1 | Cable with shielded mini-size connector on one end (male plug) | OMRON |

**Note** 1. The cables made by Nihon Wire & Cable Company Ltd. Are sold through the OMRON FA STORE Co., Ltd. The product specifications are identical to the OMRON cable specifications.

2. The cables made by Allen-Bradley are stiffer than the cables made by OMRON and Nihon Wire & Cable Company Ltd., so do not bend the Allen-Bradley cables as much as the others.

# Connectors

| Model | Specifications | Manufacturer |
|---|---|---|
| XW4G-05C1-H1-D | For node connection<br>Includes connector set screws | OMRON |
| XW4G-05C4-TF-D | For node connection (multi-drop wiring)<br>Includes connector set screws | OMRON |
| XW4B-05C4-TF-D | For node connection (multi-drop wiring)<br>Includes connector set screws | OMRON |

# Connectors (Industry Standard Sensor Connectors)

## Tyco Electronics Amp

| Model | Housing color | Applicable wire range | |
|---|---|---|---|
| 3-1473562-4 | Orange | Sheath outer diameter: 0.6 to 0.9 mm | Cross-sectional area: 0.08 to 0.5 mm$^2$ |
| 1-1473562-4 | Red | Sheath outer diameter: 0.9 to 1.0 mm | |
| 1473562-4 | Yellow | Sheath outer diameter: 1.0 to 1.15 mm | |
| 2-1473562-4 | Blue | Sheath outer diameter: 1.15 to 1.35 mm | |
| 4-1473562-4 | Green | Sheath outer diameter: 1.35 to 1.6 mm | |

## Sumitomo 3M

| Model | Housing color | Applicable wire range |
|---|---|---|
| 37104-3101-000FL | Red | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 0.8 to 1.0 mm |
| 37104-3122-000FL | Yellow | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 1.0 to 1.2 mm |
| 37104-3163-000FL | Orange | AWG26 (0.14 mm$^2$) to AWG24 (0.2 mm$^2$), sheath outer diameter: 1.2 to 1.6 mm |
| 37104-3124-000FL | Green | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.0 to 1.2 mm |
| 37104-3165-000FL | Blue | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.2 to 1.6 mm |
| 37104-3106-000FL | Gray | AWG22 (0.3 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.6 to 2.0 mm |

## OMRON

| Model | Specifications | Applicable wire range |
|---|---|---|
| XN2A-1470 | Spring clamp type | AWG28 (0.08 mm$^2$) to AWG20 (0.5 mm$^2$), sheath outer diameter: 1.5 mm max. |

# Crimp Terminals for Communications Cables

## PHOENIX CONTACT: A/AI Series

| Cable type | | Connector type | | | Dedicated tool |
|---|---|---|---|---|---|
| | | XW4B-05C1-H1-D<br>XW4B-05C1-V1R-D<br>MSTB2.5/5-ST-5.08AU | XW4B-05C4-TF-D<br>XS4B-05C4-T-D | XW4G-05C1-H1-D<br>XW4G-05C4-TF-D | |
| For Thin Cable | Signal line | AI 0.25-6BU | AI 0.25-8YE | AI 0.25-8YE | CRIMPFOX ZA3 |
| | Power line | AI 0.5-6WH | AI 0.5-10WH | AI 0.5-10WH | |
| For Thick Cable | Signal line | A1-6 | A1-10 | A1-10 | |
| | Power line | AI 2.5-8BU | AI 2.5-10BU | AI 2.5-10BU | |

# Screwdrivers for Connectors

| Model | Specifications | Manufacturer (Supplier) |
|---|---|---|
| XW4Z-00C | Special screwdriver for DeviceNet connectors | OMRON |
| SZF-1 | Special screwdriver for DeviceNet connectors | OMRON FA STORE Co., Ltd. |

# Terminating Resistors

| Model | Specifications | Manufacturer |
|---|---|---|
| DRS1-T | Terminal-block Terminating Resistor, 121 Ω | OMRON |
| DRS2-1 | Shielded Terminating Resistor (male plug), micro-size | |
| DRS2-2 | Shielded Terminating Resistor (female socket), micro-size | |
| DRS3-1 | Shielded Terminating Resistor (male plug), mini-size | |

**Note** A Terminating Resistor can also be connected to a T-branch Tap.

# T-branch Taps

| Model | Specifications | Manufacturer |
|---|---|---|
| DCN1-1C | Includes 3 connectors (When used on a trunk line, 1 branch line can be connected.)<br>A Terminating Resistor can be connected. | OMRON |
| DCN1-3C | Includes 5 connectors (When used on a trunk line, 3 branch lines can be connected.)<br>A Terminating Resistor can be connected. | OMRON |

# T-branch Connectors

| Model | Specifications | Manufacturer |
|---|---|---|
| DCN2-1 | Shielded T-branch Connector (for 1 branch line) | OMRON |

# Power Supply Sharing Taps

| Model | Specifications | Manufacturer |
|---|---|---|
| 1485T-P2T5-T5 | Required when connecting more than one power supply.<br>Reverse current prevention, ground terminal provided. | Allen-Bradley |
| DCN1-1P | One-branch tap for power supply.<br>Use this tap when connecting a communications power supply.<br>Two connectors and two fuses are standard. | OMRON |

**Note** The Power Supply Sharing Taps are sold through the OMRON FA STORE Co., Ltd.

# Connectors for I/O Power Cables to Environment-resistive Slave Output Terminals

## DRT2-OD08C(-1)

| Model | Specifications | Manufacturer |
|---|---|---|
| XS4W-D421-1□□-A | Cable with connectors on both ends (socket and plug) | OMRON |
| XS4F-D421-1□□-A | Cable with connector on one end (female socket) | |
| XS4H-D421-1□□-A | Cable with connector on one end (male plug) | |

Always use DeviceNet Communications Connectors that conform to DeviceNet Connector standards.

# T-joints

| Model | Specifications | Manufacturer |
|---|---|---|
| XS4R-D424-5 | Shielded T-joint<br>Use to branch an I/O power supply cable for an Environment-resistive Slave. | OMRON |

# Y-joint Plugs and Sockets

| Model | Specifications | | Manufacturer |
|---|---|---|---|
| XS2R-D426-□11-F | With cable | Use for Environment-resistive Slaves with 16 inputs or 16 outputs. (Branches a single connector's signals into two connectors.) | OMRON |
| XS2R-D426-1 | Without cable | | |
| XS5R-D426-□11-F | With cable | | |
| XS5R-D426-1 | Without cable | | |

# Connector Covers for Environment-resistive Slaves

| Model | Specifications | Manufacturer |
|---|---|---|
| XS2Z-22 | Waterproof Cover (meets IP67 standards) | OMRON |
| XS2Z-15 | Dust Cover | |

# MIL Cables for Connector Terminals

## Cables with Connectors on Both Ends (20-pin × 1 and 20-pin × 1)

| Model | Applicable Slave | Applicable Relay Terminal | Manufacturer |
|---|---|---|---|
| XW2Z-RI□C | DRT2-ID16ML | G7TC-ID16/IA16 | OMRON |
| | DRT2-OD16ML-1 | G7TC-OC16-1 | |
| XW2Z-RO□C | DRT2-OD16ML | G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70DFOM16/VFOM16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-SOC08 | |
| | DRT2-OD16ML-1 | G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | |

## Cables with Connectors on Both Ends (40-pin × 1 and 20-pin × 2)

| Model | Applicable Slave | Applicable Relay Terminal | Manufacturer |
|---|---|---|---|
| XW2Z-RI50-25-D1 (50 cm)<br>XW2Z-RI75-50-D1 (75 cm) | DRT2-ID32ML<br>DRT2-ID32B | G7TC-ID16/IA16 | OMRON |
| | DRT2-OD32ML-1<br>DRT2-OD32B-1 | G7TC-OC16-1 | |
| XW2Z-RO50-25-D1 (50 cm)<br>XW2Z-RO75-50-D1 (75 cm) | DRT2-OD32ML<br>DRT2-OD32B | G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70D-FOM16/VFOM16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-ZOC08 | |
| | DRT2-OD32ML-1<br>DRT2-OD32B-1 | G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | |
| XW2Z-RM50-25-D1 (50 cm)<br>XW2Z-RM75-50-D1 (75 cm) | DRT2-MD32ML<br>DRT2-MD32B | Inputs: G7TC-ID16/IA16<br>Outputs: G7TC-OC16/OC08<br>G70D-SOC16/VSOC16<br>G70D-FOM16/VFOM16<br>G70A-ZOC16-3<br>G70D-SOC08<br>G70R-SOC08 | |
| XW2Z-RI50-25-D2 (50 cm)<br>XW2Z-RI75-50-D2 (75 cm) | DRT2-MD32ML-1<br>DRT2-MD32B-1 | Inputs: G70A-ZIM16-5<br>Outputs: G70D-SOC16-1<br>G70D-FOM16-1<br>G70A-ZOC16-4 | |

## Cables with a Connector on One End (40-pin × 1 and Loose Wires)

| Model | Specifications | Manufacturer |
|---|---|---|
| XW2Z-RA200C-D1 (2 m)<br>XW2Z-RA500C-D1 (5 m) | Loose wire size: AWG28<br>Loose wires are cut. | OMRON |
| XW2Z-RY100C-D1 (1 m)<br>XW2Z-RY200C-D1 (2 m)<br>XW2Z-RY500C-D1 (5 m) | Forked terminals are attached to the loose wires.<br>Forked terminal: 161071-M2 (Nippon Terminal) | |

## Pressure-welded Flat Cable Connectors

| Model | Specifications | Manufacturer |
|---|---|---|
| XG4M-4030-T | Applicable wire size: AWG28 | OMRON |

## Loose Wires with Pressure-welded Connectors

| Product | Model | Specifications | Manufacturer |
|---|---|---|---|
| Socket | XG5M-4032-N | Applicable wire size: AWG24 | OMRON |
| | XG5M-4035-N | Applicable wire size: AWG28 to AWG26 | |
| Semi-cover | XG5S-2001 | Two for each connector | |
| Hood Cover | XG5S-4022 | Cannot be used with a multi-drop DeviceNet Connector. | |

## Applicable Post Terminals

| Manufacturer | Model | |
|---|---|---|
| PHOENIX CONTACT | AI0.5-10 | 0.5 $mm^2$ (AWG 20) |
| | AI0.75-10 | 0.75 $mm^2$ (AWG 18) |
| | AI1.5-10 | 1.25 $mm^2$ (AWG 16) |

| Manufacturer | Model | |
|---|---|---|
| Nihon Weidmuller | H 0.5/16 D | 0.5 $mm^2$ (AWG 20) |
| | H 0.75/16 D | 0.75 $mm^2$ (AWG 18) |
| | H 1.5/16 D | 1.25 $mm^2$ (AWG 16) |

# Appendix E
## Current Consumption Summary

## General-purpose Slaves

| Model | Communications current consumption |
|---|---|
| DRT2-ID08(-1) | 40 mA max. (24 V DC)<br>70 mA max. (11 V DC) |
| DRT2-OD08 | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) |
| DRT2-OD08-1 | 35 mA max. (24 V DC)<br>55 mA max. (11 V DC) |
| DRT2-ID16(-1) | 40 mA max. (24 V DC)<br>65 mA max. (11 V DC) |
| DRT2-OD16(-1) | 35 mA max. (24 V DC)<br>60 mA max. (11 V DC) |
| DRT2-MD16(-1) | 40 mA max. (24 V DC)<br>65 mA max. (11 V DC) |
| DRT2-ROS16 | 215 mA max. (24 V DC)<br>395 mA max. (11 V DC) |
| XWT-ID08(-1)* | 5 mA max. (24 V DC)<br>5 mA max. (11 V DC) |
| XWT-ID16(-1)* | 10 mA max. (24 V DC)<br>15 mA max. (11 V DC) |
| XWT-OD08(-1)* | 5 mA max. (24 V DC)<br>5 mA max. (11 V DC) |
| XWT-OD16(-1)* | 10 mA max. (24 V DC)<br>15 mA max. (11 V DC) |
| DRT2-ID16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-OD16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-MD16TA(-1) | 45 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-ID16S(-1) | 215 mA max. (24 V DC)<br>150 mA max. (11 V DC) |
| DRT2-MD16S(-1) | 135 mA max. (24 V DC)<br>115 mA max. (11 V DC) |
| DRT2-ID16ML(-1) | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) |
| DRT2-ID16MLX(-1) | 40 mA max. (24 V DC)<br>60 mA max. (11 V DC) |
| DRT2-OD16ML(-1) | 45 mA max. (24 V DC)<br>75 mA max. (11 V DC) |
| DRT2-OD16MLX(-1) | 45 mA max. (24 V DC)<br>75 mA max. (11 V DC) |
| DRT2-ID16SL(-1) | 30 mA max. (24 V DC)<br>55 mA max. (11 V DC) |
| DRT2-OD16SL(-1) | 35 mA max. (24 V DC)<br>65 mA max. (11 V DC) |
| DRT2-ID16SLH(-1) | 35 mA max. (24 V DC)<br>65 mA max. (11 V DC) |

| Model | Communications current consumption |
|---|---|
| DRT2-OD16SLH(-1) | 35 mA max. (24 V DC)<br>70 mA max. (11 V DC) |
| DRT2-ID32ML(-1) | 55 mA max. (24 V DC)<br>100 mA max. (11 V DC) |
| DRT2-OD32ML(-1) | 70 mA max. (24 V DC)<br>120 mA max. (11 V DC) |
| DRT2-MD32ML(-1) | 60 mA max. (24 V DC)<br>110 mA max. (11 V DC) |
| DRT2-ID32B(-1) | 45 mA max. (24 V DC)<br>100 mA max. (11 V DC) |
| DRT2-OD32B(-1) | 55 mA max. (24 V DC)<br>120 mA max. (11 V DC) |
| DRT2-MD32B(-1) | 50 mA max. (24 V DC)<br>110 mA max. (11 V DC) |
| DRT2-ID32BV(-1) | 45 mA max. (24 V DC)<br>100 mA max. (11 V DC) |
| DRT2-OD32BV(-1) | 55 mA max. (24 V DC)<br>120 mA max. (11 V DC) |
| DRT2-MD32BV(-1) | 50 mA max. (24 V DC)<br>110 mA max. (11 V DC) |
| DRT2-ID32SL | 55 mA max. (24 V DC)<br>100 mA max. (11 V DC) |
| DRT2-ID32SL-1 | 55 mA max. (24 V DC)<br>90 mA max. (11 V DC) |
| DRT2-OD32SL | 50 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-OD32SL-1 | 50 mA max. (24 V DC)<br>75 mA max. (11 V DC) |
| DRT2-MD32SL(-1) | 50 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-ID32SLH | 65 mA max. (24 V DC)<br>100 mA max. (11 V DC) |
| DRT2-ID32SLH-1 | 65 mA max. (24 V DC)<br>105 mA max. (11 V DC) |
| DRT2-OD32SLH | 55 mA max. (24 V DC)<br>80 mA max. (11 V DC) |
| DRT2-OD32SLH-1 | 55 mA max. (24 V DC)<br>85 mA max. (11 V DC) |
| DRT2-MD32SLH(-1) | 60 mA max. (24 V DC)<br>90 mA max. (11 V DC) |

**Note** The communications current consumption indicated for Expansion Units is the additional current consumed when the Expansion Unit is connected to a Basic Unit.
For example, the current consumption for a combination of a DRT2-ID16 Basic Unit and an XWT-OD16 Expansion Unit is 40 + 10 = 50mA (24 V DC), 65 + 15 = 80 mA (11 V DC).

## Environment-resistive Slaves

| Model | Communications current consumption |
|---|---|
| DRT2-ID08C(-1) | 115 mA max. |
| DRT2-HD16C(-1) | 200 mA max. |
| DRT2-OD08C(-1) | 35 mA max. |
| DRT2-ID04CL(-1) | 35 mA max. |
| DRT2-OD04CL(-1) | 35 mA max. |
| DRT2-ID08CL(-1) | 35 mA max. |
| DRT2-HD16CL(-1) | 40 mA max. |
| DRT2-OD08CL(-1) | 35 mA max. |
| DRT2-WD16CL(-1) | 35 mA max. |
| DRT2-MD16CL(-1) | 40 mA max. |

## Analog Slaves

| Model | Communications current consumption |
|---|---|
| DRT2-AD04 | 90 mA max. (24 V DC)<br>150 mA max. (11 V DC) |
| DRT2-AD04H | 70 mA max. (24 V DC)<br>110 mA max. (11 V DC) |
| DRT2-DA02 | 120 mA max. (24 V DC)<br>220 mA max. (11 V DC) |
| DRT2-TS04T | 70 mA max. (24 V DC)<br>110 mA max. (11 V DC) |
| DRT2-TS04P | 70 mA max. (24 V DC)<br>110 mA max. (11 V DC) |

# Appendix F
## Precautions with Connecting Two-wire DC Sensors

When using a two-wire sensor with a Slave using transistor inputs, check that the following conditions have been met.

Failure to meet these conditions may result in operating errors.

## Relation between ON Voltage of Slave with Transistor Inputs and Sensor Residual Voltage

$V_{ON} \leq V_{CC} - V_R$

$V_{CC}$: I/O power supply voltage (The allowable power supply voltage range is 20.4 to 26.4 V, so 20.4 V will be used here to allow for the worst possible conditions.)

$V_{ON}$: ON voltage for a Slave with Transistor Inputs

$V_R$: Sensor's output residual voltage

It is sometimes possible to satisfy the above equation by adjusting the I/O power supply voltage ($V_{CC}$) to 26.4 V.

## Relation between ON Current of Slave with Transistor Inputs and Sensor Control Output (Load Current)

$I_{OUT}$ (min) $\leq I_{ON} \leq I_{OUT}$ (max.)

$I_{OUT}$: Sensor control output (load current)

$I_{ON}$: Slave ON current

$I_{ON} = (V_{CC} - V_R - V_F)/R_{IN}$

$V_F$: Internal residual voltage of a Slave with Transistor Inputs (1.5 V)

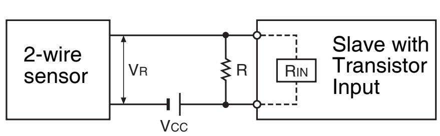
$R_{IN}$: Input impedance of a Slave with Transistor Inputs

When $I_{ON}$ is smaller than $I_{OUT}$ (min), connect a bleeder resistor R.

The bleeder resistor constant can be calculated using the following equation.

$R \leq (V_{CC} - V_R)/(I_{OUT}\text{ (min.)} - I_{ON})$

Power $W \geq (V_{CC} - V_R)^2/R \times 4$ [allowable margin]



## Relation between OFF Current of Slave with Transistor Inputs and Sensor Leakage Current

$I_{OFF} \geq I_{leak}$

$I_{OUT}$: OFF current of a Slave with Transistor Inputs

$I_{leak}$: Sensor's leakage current

Connect a bleeder resistor if $I_{leak}$ is greater than $I_{OFF}$.

The bleeder resistor constant can be calculated using the following equation.

$R \leq (I_{OFF} \times R_{IN} + V_F)/(I_{leak} - V_{OFF})$

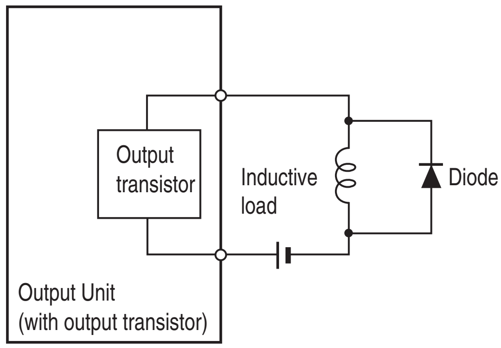
Power $W \geq (V_{CC} - V_R)^2/R \times 4$ [allowable margin]

# Appendix G

## Wiring External Output Signal Lines

Observe the following precaution when you wire the external output signals.

- If you connect inductive loads to the output signals, connect a diode to absorb counterelectromotive force near each inductive load.




Attaching a Diode in a DC Circuit
as an Output Signal Noise Countermeasure

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# Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W404-E1-14

Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

| Revision code | Date | Revised content |
|---|---|---|
| 01 | September 2002 | Original production |
| 03 | July 2003 | Added information on Sensor Connector Terminals, Remote I/O Terminals (with relay outputs, and with three-tier terminal blocks), and MIL Connector Terminals throughout the manual. |
| 04 | January 2004 | Added information on Screw-less Clamp Terminals, Sensor Connector Terminals, and detection functions throughout the manual. |
| 05 | July 2004 | Added information on new analog slaves (High-resolution Analog Input Terminals and Temperature Input Terminals). |
| 06 | September 2006 | Added information on Advanced Environment-resistive Slaves throughout the manual, including specifications, windows, and indicators.<br>**Page 200, 227, 231, and 234**: Changes made or information added to specifications.<br>**Pages 201, 202, 221, 227, 228, 231, and 234**: Information added on indicators.<br>**Pages 207 and 208**: Information added on windows.<br>**Pages 208 and 209**: Information added on status check boxes. |
| 07 | April 2008 | Added information on Screw-less Clamp Terminals with 16 inputs and 16 outputs. |
| 08 | February 2010 | Revision for error correction. |
| 09 | October 2016 | Revision for error correction. |
| 10 | September 2017 | Revision for error correction. |
| 11 | December 2017 | Corrected mistakes.<br>**Page 56:** Added description on Unit Conduction Time. |
| 12 | February 2022 | Revision for error correction and description addition. |
| 13 | January 2024 | Revision for description addition. |
| 14 | June 2024 | Revision for error correction. |

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